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POINTS FOR PRODUCERS.

Silver Beet as a Fodder.

Silver Beet has been extensively grown in New Zealand for some years now, and is gradually becoming an important fodder crop in the temperate parts of Australia where the late Spring and Summer rainfall is sufficient for the good growth of Summer fodders. The general experience of growers appears to be that it is an excellent fodder crop, particularly for milking cows, and that the flow of milk from cows grazing on Siver Beet, keeps up better than from most other fodders. Sheep or dry cattle fatten on it very readily once the animals have become accustomed to the forage. The Superintendent of Experimental Work of the Department of Agriculture (Mr. W. J. Spafford) says that when managed properly, at least six grazings should be obtained from the crop in the 12 months commencing with the first feeding-off, but this will only be done if it is fed off rapidly each time, because the plants shoot very quickly after being grazed, and stock should be removed before they commence eating the fresh shoots. When Silver Beet is grown for livestock, only suitable varieties for the purpose should be used, that is to say, those kinds having the minimum of leaf-blade, and the maximum of snow-white midrib. Two varieties at present doing well in Australia are "Delicious" and "Lucullus." If the seed is drilled in rows about 28in. to 30in. apart, and the plants thinned out from 12in. to 15in. apart in the rows, very heavy returns of grazing fodder should result. If the growth is fed off rapidly, the root stocks will not be injured by the livestock.

Land Clearing on Eyre Peninsula.

The natural feed on most parts of Central Eyre Peninsula has dried off, but on areas where heavy thunderstorms have been experienced the grass has sprouted again. Whilst from the grazing point of view this is satisfactory, it is a decided disadvantage where areas of scrub have been rolled preparatory to burning off. Unlike the greater part of the mallee land on the Eastern side of the Gulf where the growth of scrub is generally thick enough to carry a fire, on the mallee lands of Eyre Peninsula, settlers depend largely on the natural grasses to provide them with a running burn when clearing. Consequently, a late growth of grass such as that promised in some parts this year materially interferes with this operation.

Director of Agriculture in the South-East.

Recently the Director of Agriculture (Professor Arthur J. Perkins) visited the Government Experimental Farm, Kybybolite, chiefly with the object of inspecting the irrigated summer crops. He found the maize in excellent condition, but the numerous varieties of Sorghum which the Department of Agriculture recently imported from America were very backward and suffering from low summer temperatures

The well from which the water was drawn for irrigation purposes continued to appear inexhaustible. Notwithstanding the fact that it was being drawn from at the rate of 12,000 to 13,000 gallons per hour for 10 successive hours, it was not lowered more than two or three inches. Professor Perkins attended the quarterly meeting of the Mount Gambier Herd Testing Society and also visited the Experimental Plots being conducted by the Department at Millicent. These plots are carrying barley grown from seed imported by the Department from England, France, and New Zealand. The crops generally were very fair, except that in places they were suffering from the development of convolvulus, which would have the effect of depressing yields. Livestock generally in the South-East were in excellent condition, owing to the abundance of feed.

Ayrshire Cattle at Kybybolite.

From some good types of Ayrshire and grade Ayrshire cattle, purchased from various noted herds in Victoria some years ago, the Department of Agriculture has built up a very fine Ayrshire Stud at the Government Experimental Farm, Kybybolite. There is on this farm a fairly complete dairy equipment, including milking machines, feeding and housing sheds, a 90-ton silo, and a dairy for handling the milk and cream. Careful records of milk produced and the test of same, and the feed utilized by the herd, have been kept for the past few years. In dealing with the performances of the animals which have been bred and reared on the farm, the manager (Mr. L. J. Cook) reported recently that during the year 1922-23, the mean yield was 593galls. of milk per cow, and the butterfat yield 238lbs. per cow. It must be borne in mind that this result has been obtained practically from cows on their first and second lactation period. During the 12 months, five cows completed their first lactation period, eight cows completed their second, and one cow completed her third, whilst 11 heifers started their first period. The season was not altogether a favorable one. An unusually dry autumn was experienced, and the continued wet through the winter months and the consequent poor growth of food and crops deprived the herd of early green feed, and caused the average returns for June, July, August, and September to be lower than they would have been in ordinary seasons. However, taking into consideration the age of the cows, the returns secured cannot be looked upon as anything but satisfactory. The gross average return per cow for the year, in terms of money, was £23 5s. 5d. The cost of food, including rent of pastures, was £11 18s.

Pruning Young Trees.

At the State Orchard, Blackwood, experimental work has been undertaken with the object of determining the best type of pruning to which to subject trees at planting for the purpose of producing a well balanced head. There are 36 trees under observation in this particular test, all of which are growing well. The Manager of the

Orchard (Mr. R. Fowler) stated recently that the test gives promise of very interesting developments. Photographic records of the trees at different stages are being taken, and these, in conjunction with other data, should prove a useful guide to orchardists.

Australian Wheats in North Africa.

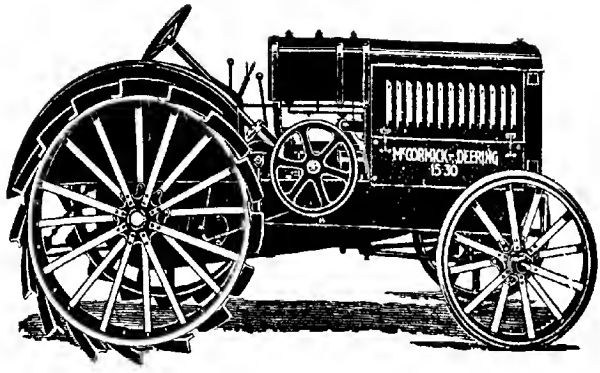
Of a large number of varieties of wheat from many countries tried in Morocco for the purpose of determining the type most suited to local conditions, a South Australian bred wheat, "Rajah," has proved itself to be best, according to an official report recently presented to the Academie d'Agriculture de France. This wheat is one of the three-quarter bred King's varieties produced some years ago at the Roseworthy Agricultural College by the Superintendent of Experimental Work (Mr. W. J. Spafford) during the time the Director of Agriculture (Professor Arthur J. Perkins) was Principal. Quite a number of the progeny of this particular cross has done well in South Australia, two outstanding examples being Sultan and Felix.

Not only was this South Australian wheat proved by actual test by the Department of Agriculture in Morocco to suit the requirements of wheat growers there better than any other, but other Australian wheats stand very high in the table of relative values. In the first nine, besides Rajah, there were Fan, Baroota Wonder, Iguana, Thew, and Bearded Gluyas. Fan is one of the types bred by the late William Farrer, which has proved an extremely good parent in cross fertilisation, and which forms part of the stock of many of the Roseworthy Agricultural College varieties. Baroota Wonder is a selection from Ward's Prolific, made by Mr. G. Crittenden, of this State. It is a good hay wheat in the early districts. At the Government Experimental Farm, Minnipa, the variety is being worked on with the object of selecting good strains. Iguana is a Roseworthy Agricultural College wheat which is by no means well known in this State, but has had a measure of popularity in other States of the Commonwealth. Thew is another variety produced by the late William Farrer, which was at one time a very popular wheat, but it has been displaced in many districts by more recently introduced types. Bearded Gluyas is a Roseworthy Agricultural College selection from Gluyas, itself a selection made by Messrs. Gluyas, of this State.

Besides these varieties, Sultan, College Eclipse, and King's Red are also mentioned as being satisfactory for the North African conditions under notice. All of these are Roseworthy Agricultural College wheats, and they are all growing in popularity in various States of Australia. College Eclipse has had quite a vogue in the neighbouring State of Victoria during recent years.

The Apple Crop.

After having personally seen a considerable portion of the fruit-growing localities, and also discussed the seasonal prospects with growers and inspectors from the various fruit districts, the Horticultural Instructor (Mr. Geo. Quinn) stated that the apple crop this year is, generally speaking, not only a good one, but the quality of the



McCormick-Deering Tractors.

THE McCormick-Deering Tractor is well adapted to farm work. It is equipped with a vertical 4-cylinder valve-in-head engine, which operates economically on kerosene and other low-priced fuels. The cylinders are cast separately and fitted into the engine block, so that they may be easily removed and replaced in case they become scored or worn. The Tractor is equipped with high tension magneto, with impulse starter, has a throttle governor, and the principal bearings throughout the entire machine are roller and ball. A belt pulley of large diameter on the right side of the machine is conveniently placed for belt work, and can be started or stopped from the driver's seat, independent of the engine. Three forward speeds, 2, 3, and 4 miles an hour, and reverse.

TWO SIZES: 10-20 and 15-30.

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fruit is fine, and its freedom from Black Spot and Codlin Moth is very marked. This is very gratifying in view of the fact that in the earlier period of the growth of the fruit, the season was exceptionally wet, and one calculated to result in the development of Black Spot and other fungous diseases in abundance.

Herd Testing at Murray Bridge.

In a report on the third year of operations of the River Murray Herd Testing Association, prepared by the Director of Agriculture (Professor A. J. Perkins), and issued in bulletin form by the Department of Agriculture, a comparison is made of the results over the three years of the herds which have been under test for that period. This reveals that the average milk production per cow, which was, for the first year, 648.42galls., in 1921-22 rose to 692.57galls., and in 1922-23, to 719.82galls. Similarly the average butterfat production per cow rose from 285.87lbs. in 1920-21, to 305.83lbs. in 1921-22, and 315.76lbs. in 1922-23. Hence, since the first season, the average improvement in these herds has been represented by 71.4galls. milk, and 29.89lbs butterfat. At 10d. per gall. for milk, this represents average improvement in gross production per cow of £2 19s. 6d. per annum. Tables showing the average daily milk yields, month by month, during the three years' operations of the Society, reveal remarkably even production from the herds from one end of the year to the other. Relatively to the total number of cows in the herds, whether dry or in milk, the milk yield averaged 2galls., a day over a period of seven months, *i.e.*, from August to February, inclusive, and 1¾galls. over the remaining five months, *i.e.*, from March to July. Relatively to cows actually in milk, and exclusive of dry cows, the average milk yields have been about 2½galls. from August to February, and 2galls. for the balance of the year. Similarly, a comparison of the average daily butterfat production, month by month, for the three years, reveals what Professor Perkins has referred to as an "extraordinary regularity in butterfat production from one end of the year to the other." From the point of view of the total number of cows in the herds, the extreme monthly variation is about one-tenth of a pound, and from the point of view of cows actually in milk, about three-twentieths of a pound. The mean percentage tests, on the other hand, show more pronounced variations, being highest in the months of declining milk supplies. Butterfat production appears to all intents and purposes to be a fixed quantity from one end of the year to the other, notwithstanding seasonal variations in percentage tests. When tests are abnormally high, it may be inferred that milk production is on the decline, and *vice versa*.

Chickens at Parafield Station.

There are now some thousands of White Leghorn and Black Orpington chicks at the Parafield Poultry Station, where a record percentage has been secured in hatchings this season. These were summer, or, as it is often called, autumn hatched—a practice which

has been the rule at this Poultry Station for many years. The Poultry Expert (Mr. D. F. Laurie) explains that experience has shown that chickens hatched after the first week in October are seldom worth rearing, yet chickens hatched in February and March thrive and make fine birds. In the case of table birds, a chicken so hatched comes in at a time when the market is bare of good quality and when prices are high

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Cost of Feeding Dairy Cattle.

In addition to the production of the cows, the quantity of food consumed by the Ayrshire herd at the Government Experimental Farm, Kybybolite, is carefully recorded. During the 12 months ended September 30th last, the average quantity of feed given to each cow in the herd was, according to the Manager of the Farm (Mr. L. J. Cook), as follows.—Hay chaff, 14cwts. 3½qrs.; ensilage, 1 ton 16cwts.; bran 11bush.; oats (crushed) 33½bush.; greenfeed 4.4cwts.; pasture four acres. Valuing hay chaff at £4 per ton; ensilage at £1 per ton; bran at 2s. 2d. per bushel; oats at 3s. per bushel; greenfeed at 10s. per ton; and calculating the rental value of pasture at 4s. per acre, the cost of the food of each individual cow for 12 months works out at £11 18s. as against the value of the production per cow for the same period, £23 5s. 5d.

Pure Bred Dairy Bulls.

The Department of Agriculture has issued an invitation to breeders of dairy cattle to submit bulls for sale at auction under the provisions of the Dairy Cattle Improvement Act. Arrangements have been made for a sale to be held on the Show Grounds on March 27th, the day of the Murray Bridge Agricultural & Horticultural Society's Show. From the purchaser's point of view, the chief attraction of this sale lies in the fact that he may buy a sire for his herd, and immediately claim from the fund established under the Act referred to above, a refund of 60 per cent. of the purchase price up to £60. He is also assured that the animal purchased will be true to type, well grown, free from tuberculosis, and the progeny of a dam which has reached a satisfactory butterfat production standard.

Fruit Fly.

In view of the somewhat alarming reports in a section of the Victorian press dealing with the appearance of fruit fly at Mildura, action has been taken by the Horticultural Branch of the South Australian Department of Agriculture to secure definite information with respect to the nature of the outbreak. Accordingly, Mr. C. G. Savage (Manager of the Berri Experimental Orchard) has been dispatched to Mildura, with the object of observing on the spot the distribution of the pest and the nature of the steps taken by the Victorian Department of Agriculture to suppress it. This precaution has been taken by the authorities in South Australia also with the object of being prepared

to deal with any outbreak should it occur in any of the irrigation settlements in this State. When questioned on the matter recently, the Horticultural Instructor (Mr. George Quinn), stated that although the chances of the pest being introduced into South Australia were somewhat remote, it was to be hoped that travellers passing from Victoria down the river to South Australia would lend their loyal support to the authorities charged with the duty of keeping the State free of this and similar noxious insects, which could be best done by refraining from sending or carrying any fresh fruit from the Victorian or New South Wales irrigation areas into South Australia.

Obstructing a Fruit Inspector.

Orchardists in South Australia as a general rule adopt a most friendly attitude toward officers of the Horticultural Branch of the Department of Agriculture who are charged with the administration of the Vine, Fruit, and Vegetable Diseases Act. This legislation is designed to bring about the suppression of pests which, left uncontrolled, are capable of very seriously affecting the fruit industry, and because of this, growers as a rule loyally support the inspectors in their work. An example to the contrary, however, occurred during the past week, when a grower in a lower northern fruitgrowing district was proceeded against in the local court for obstructing the inspector and accompanying his obstructions with threats of violence. The court fined the grower £2, and court fees amounting to 15s. This is the first occasion on which it has been found necessary to take action of this nature under the provisions of this legislation.

INQUIRY DEPARTMENT.

Any questions relating to methods of agriculture, horticulture, viticulture, dairying, &c., diseases of stock and poultry, insect and fungoid pests, the export of produce, and similar subjects, will be referred to the Government experts, and replies will be published in these pages for the benefit of producers generally. The name and address of the inquirer must accompany each question. Inquiries received from the question-boxes established by Branches of the Agricultural Bureau will be similarly dealt with. All correspondence should be addressed to "The Editor, *The Journal of Agriculture*, Adelaide."

[Replies furnished by Mr. A. H. ROBINS, B.V.Sc., Stock and Brands Department.]

"L. A., Port Lincoln, has aged medium draught mare, good condition, head swollen, eyes partly closed and discharging reddish fluid. A little "groggy" on legs.

Reply—The horse is suffering with a condition known as *Purpurea haemorrhagica*, and, under the circumstances, her chances of recovery are exceedingly slight. Such a condition can be handled with any great chance of successful issue only by qualified veterinary surgeons. It is usually a condition arising secondarily to other diseases, such as strangles, influenza, &c., though it sometimes appears with no history of pre-existing illness. It may, in a general way, be considered a form of general blood poisoning.

"W. G. S.," Cowell, asks for cure for disease in sheep locally known as "pink eye."

Reply—Unfortunately it is not possible by any system of internal medication to effect a cure of this condition of sheep's eyes, or to prevent its further spread. The only combative measures are isolation of those animals affected from those which are sound, and the application of local treatment to the affected eyes. The necessity for isolation arises from the fact that flies are a very active agency by which the disease is spread in the flock after it once makes an appearance. The condition may, in some cases in the commencement, be due to grass seeds getting into the eyes, but it is commonly set up by the pollen dust thrown off by the grasses and wildflowers in the wilting stages. This pollen dust getting into the eyes while they are grazing, sets up intense irritation and inflammation. The flock should, if possible, be kept on short grass. The following treatment of affected eyes is simple and effective:—Clean the eyes first by bathing with warm boracic lotion. Then put in a few drops of the following lotion:—Boracic acid, 1 dram; distilled water, 1 pint. Repeat three or four times daily. If possible, keep affected sheep in a shady position.

Hon. Secretary, Shoal Bay Agricultural Bureau, reports horses falling off in condition, and slobber at mouth.

Reply—Have a close and thorough examination made of the horse's mouth, when you are almost certain to find some condition which would account for the slobbering. The mucous membrane of the mouth and cheeks may be scratched and inflamed from grass seeds, &c., or the horse's teeth may have sharp points on them which are similarly scratching the inside of the mouth and cheeks. All sharp points on the teeth must be filed off.

"C. E. B.," Waterloo, reports pigs weak in hindquarters, unable to walk.

Reply—See that the sties are dry, clean, and warm, and provide shelter from winds. Give the pigs from 2oz. to 4oz. of castor oil in a little milk to unload the bowels, and if necessary to get prompt action, give enemas of soap and warm water. Supplement milk feeding with food rich in salts, such as a little pollard or crushed oats, and 10gr. to 20gr. of calcium sulphate can be added to the food night and morning. Be careful always to feed regularly, and avoid overfeeding.

"G. McK.," Colton, has horse in poor condition, with large soft lump on each side of wither.

Reply—The horse is suffering from a fistulous wither, and will require to have an operation performed on him before a cure can be effected. This can only be performed by a competent man, and even in the hands of a most capable person it would require months of treatment before the complaint would be cured and healed. It would require to be opened up, from both sides probably, right down to the top of the spine which has been bruised. Unless the animal is a valuable one it would not be worth while to have him treated, because you could not do it yourself with any hope of success.

"J. M. Y.," Milang, reports litter of pigs that have developed a hard dry skin, very similar to mange. Matter is being discharged from the eyes, and the pigs are constantly rubbing themselves.

Reply—Pay particular attention to the feeding of the pigs, because you have apparently allowed their blood to get out of order in this way, with the result that they are suffering from a severe form of eczema. Avoid giving them heating food. As far as possible, provide plenty of opportunity for exercise, and feed liberally on green stuff. Internal treatment is very important to check this condition. Give them all a dose or two of Epsom salts, about 1oz. to 2oz. each. Mix this in their feed, and repeat occasionally. Also give twice daily in the feed about 5gr. (per pig) of sulphate of iron. Externally wash the pig with 1 per cent solution of lysol in warm water to clean the body and remove scabs. Dry thoroughly, and smear them over with the following dressing:—Flower of sulphur, 1 part; raw linseed oil, 8 parts. Apply the dressing over one half of the body the first day, and over the other half the next day. Repeat every three or four days until the irritation ceases.

"L. O.," Lameroo, has eight-year-old draught gelding passing dung saturated with blood.

Reply—Your horse is hæmorrhaging from the bowels, and should be kept absolutely resting. Feed only on light easily digested food, and give him ½ dram of lead acetate twice daily dissolved in about ½ pint of cold water, to which a little vinegar has been added.

"W. R.," Giles Corner, reports cow on being milked gave congealed blood from one quarter.

Reply—It appears that an injury has occurred to the quarter affected. Bathe part with fomentations, and keep the teat entrance thoroughly clean to avoid further infection by germs, which would soon result in mastitis. Keep the free end of the teat smeared with a little boracic ointment. Milk out the quarter very gently three or four times a day so long as any blood continues to come away with the milk, which should be destroyed. The milk from the remaining quarters should be quite all right. Be very careful of injecting liquids into the udder through the teat. It is a dangerous practice.

"E. N.," Sevenhills, asks method of dealing with flies which are stinging cows.

Reply—The flies which are causing the trouble are the Stomoxys, or stinging stable fly, which in general appearance are very similar to the ordinary house fly. They are quite common during the late summer and autumn, and seasonal influences may largely account for their great prevalence this year. The larvæ live in fresh dung. They are blood suckers, and the only reason for their showing a preference for the Jersey cow over other breeds would lie in the fact

of the Jersey cow being finer and thinner skinned, so that the proboscis can more readily penetrate the hides and suck the blood. To mitigate the trouble, keep the cowshed clean and free from collections of dung as much as possible. To protect the cattle, their bodies may be dressed with weak decoctions of tobacco, aloes, or asafoetida, applied to those parts which seem most prone to attack by the flies.

"F. M. J.," Mount Bryan, reports mare foaled twins in September. Mare said to have assistance to give birth to the first foal, and the second foal was carried for an additional two and a half days. Legs were very swollen, but this has been cured by repeated bathings.

Reply—The breeding bag of your mare has become infected subsequent to the foaling, and her condition is chronic. The swelling of the legs is also a sequel of the foaling, and the recurrence of the swelling is largely due to her system becoming debilitated by absorption of poison from the breeding bag. She will require long and careful nursing if she is to do any good, and liberal feeding should be supplemented by the use of medicines. Give her the following powder twice daily for a week, spell for three or four days, and repeat:—Pulv. nux vom., 1 dram; sulphate of iron, 1 dram; pulv. rad. gentian, 2 drams. Mix this powder in a spoonful of treacle to make a stiff paste, and smear it over the tongue and back teeth with a piece of smooth flat stick. Water her, if possible, out of a bucket, and put 1oz. of hyposulphate of soda in it daily. Local treatment is necessary, and you must make sure that the solutions you use for douching are carried right into the breeding bag, and not only the back passage (this is not sufficient, for if you only wash out the back passage you are not getting at the source of the trouble). See that the end of the tubing is put right in through the neck of the breeding bag. Flush out first with warm saline solution (common salt, 1 teaspoonful; water, 1 pint). Then flush by injecting about ½ pint to 1 pint of the following:—Iodine, 1 part; potass. iod., 3 parts; water, 100 parts.

"C. W.," Wynarka, asks ration for cow that is constantly chewing rags and bones.

Reply—Add bran and 2lbs. or 3lbs. of crushed oats to the feed, and mix in it each day 1oz. of common salt and a tablespoonful of fresh ground bone meal. If possible, stop her from having access to old bones and old clothing. It will be harder to check the habit if she still has them available to her.

"M. S. L. B.," Nunjikompita, has cow with one-quarter of udder swollen and hard, and the milk is tinged with blood. The swollen quarter is cracked, and a sore has developed.

Reply.—Your cow has a bad attack of mastitis in that quarter. Keep the udder thoroughly clean, and dress the wound with mild antiseptics; syringe out the cavity. It should, with help in this way, soon heal up. If you observe every care in handling and milking her, and at all times exercise thorough cleanliness, the other quarters should not become affected, and she will still remain of value to you as a three-quarter beast.

"M. K.," Colton, asks treatment for lambs with "dry bible."

Reply—Give the sheep a purgative dose each of two packets Epsom salts dissolved in half a pint of warm water. For lambs, give one packet as a dose. Supply them with the following lick:—Powdered gentian root, 4 parts; sulphate of iron, 1 part; common salt, 2 parts; soda bicarb., 2 parts; charcoal, 2 parts. If hand fed, they can be given one tablespoonful in the food daily. This mixture should be carefully and thoroughly prepared.

"W. J. G.," Kangarilla, reports (1) sow that remains barren after repeated service, and (2) horse with thin skin, and easily contracts sore shoulders.

Reply—(1) A careful expert examination would be necessary to ascertain the cause of the sterility. It may be due to abnormal conditions of the womb or ovaries, or too fat or too lean condition. If the condition is at fault, you can remedy that by proper handling. If not due to this cause, try her with another boar, and if she misses again, send her to the butcher, because she will most likely be diseased in the genital organs. (2) *Re* horse with sore shoulders. Careful fitting of the collar is very essential, and the lining should be kept soft and clean. It can be lined with a piece of sheep skin, with the wool next to the animal's shoulders, but the same care must be taken to keep this soft and clean. It can be removed occasionally, and a fresh piece put in place of the old piece. To harden the skin, bathe it frequently with a solution of wattle bark or strong brine.

"F. H.," Bowhill, has heavy draught horse passing urine with manure.

Reply—There would appear to be a fistula between the urethra and bowel, just inside the anus. This is a very rare accident. There is nothing you can do to relieve the condition without the services of a qualified veterinary surgeon.

"E. L.," Kalangadoo, has young heifer with cow-pox on the udder.

Reply—As a rule simple hygienic precautions and cleanliness will suffice to prevent any complications from cow pox, which of itself is usually benign, and runs a more or less regular course. Clean the udder and teats thoroughly by bathing with a warm solution of boracic acid in boiled water, and dry thoroughly and gently. Apply thinly over the parts a little antiseptic ointment, *e.g.*, boracic acid, ½oz.; eucalyptus, 30 drops; vaseline, 4oz. This will act as a protective and healing agent, will prevent cracking of the teats, and render the animal more tractable for milking. Repeat the treatment regularly, wiping the udder clean and dry each time just prior to milking.

Hon. Secretary, Blackheath Agricultural Bureau, reports mare in good condition after drinking rolls as if in great pain.

Reply—The mare is evidently subject to repeated attacks of so-called "water colic," and the remedy would seem to be one of judicious handling. Always water before feeding, take the chill off the water, and do not let her fill herself up with one long drink, but let her have a half drink, and get the balance some little time after. Let a reasonable period of about an hour at least elapse after watering and feeding before putting her to work. When knocking off work, let her spell for a while to cool down thoroughly before giving her a drink, and again only give her a half a drink at a time. Horses in work naturally get more thirsty than when at rest, and a horse out at grazing will usually visit the watering place several times a day, and drink only in small quantities at a time. When in work, they cannot visit the water trough except at long intervals, and, being more thirsty, they take too much at once, with the inevitable result that they frequently go down shortly afterwards with an attack of colic. Give her a daily ration of common salt, well mixed in the food, and put her on to a tonic powder for two or three weeks, consisting of—powdered nux vomica, 4oz.; pulv. gentian root, 8oz.; pulv. fer. sulphate, 4oz.; fenugrek, 1lb. Two tablespoonfuls to be mixed in food two daily, or mix dose with a spoonful of treacle to make a stiff paste, and smear on back of tongue and teeth with a smooth flat stick immediately after feeding.

FERTILISERS AND SOIL AMENDMENTS.

[By W. J. SPAFFORD, Superintendent of Experimental Work.]

Fertilisers are substances supplied to soils to make good any deficiency of the plant foods essential to the growth of crops, whilst soil amendments are materials used to correct any faults in the mechanical condition of a soil; and to enable one to understand the economical use of these aids to cropgrowing, some knowledge of the requirements of crops, and how they are obtained, is necessary.

FOOD REQUIREMENTS OF PLANTS.

Chemists find when they analyse plants that all of them contain:—Carbon, hydrogen, oxygen, sodium, magnesium, sulphur, chlorine, iron, silica, manganese, nitrogen, phosphorus, potassium, calcium, and although other substances are sometimes found, none of the above is ever absent, and so it is natural to consider that all of them are essential to plant growth, and with the possible exception of silica, experiments confirm this, for if any of these substances be kept from a plant it either does not grow at all, or else makes but a very weakly plant.

WHERE PLANTS GET THEIR VARIOUS FOODS.

Nearly every individual plant that grows starts from a seed, which in most cases contains but very little material in it, so that practically all the mass comprising the plant is obtained from somewhere after the very small supply of food contained in the original seed (or cutting, tuber, bulb, &c.) is used up. Now, of the materials forming the plant, the carbon (about 50 per cent. of the dry substance of plants) is obtained from the air, the hydrogen is obtained mainly from water, the oxygen (which, with the hydrogen, equals something over 40 per cent. of the dry substance of plants) is obtained mainly from water and air, and all other substances—mineral matters—are obtained by plants from the soil.

HOW PLANTS GET THEIR VARIOUS FOOD SUBSTANCES.

Carbon.—This important part of plants is obtained from the atmosphere. All of the higher animals breathe in air, of which some of the oxygen is used in the combustion of the food eaten, and carbonic acid gas is breathed out, and all combustion of organic matter containing carbon, such as fires, decompositions, &c., also gives off carbonic acid gas, and these two main sources keep up a constant and fairly regular supply of carbonic acid gas in the atmosphere. In the presence of sunlight, the green parts of plants have the power, which is fully used, of absorbing this carbonic acid gas, and retaining the carbon which it contains.

Hydrogen.—Water is a combination of hydrogen and oxygen, and is constantly passing through the growing plant, from roots to leaves, and what hydrogen is wanted by plants, other than in water, they can secure by splitting up the water.

Oxygen.—Besides getting oxygen from water and other compounds, the plants absorb free oxygen through their leaves in the absence of sunlight, and through their growing roots at all times.

Mineral Matters.—The mineral matters essential to plant growth are all secured from the soil, and, as far as is now known, the only way that these can enter the plant is in solution. The roots of plants are constantly absorbing moisture, which passes up the tissues of the plant, and most of it is evaporated from the leaves, and to our knowledge this soil moisture—other than gases—is the only substance taken up by plant roots, and so, for the mineral matters to enter the plant, they must be soluble in the soil moisture.

Mechanical Condition of the Soil.—The soil supplies the water, some oxygen, and the mineral matters to plants, and as most plants are fixed into soil, it must be in such a mechanical state that water and air enter it easily, and the roots of plants can readily penetrate it in search of their requirements.

MANURING.

As we have no control over the supply of carbon to plants, and but very little over the hydrogen and oxygen, manuring may be defined as "making good any deficiency of mineral plant foods." But analyses of soil and field results have both shown that, with comparatively few exceptions, all soils are supplied with sufficient of most of the mineral matters required by crops to last for hundreds, and perhaps thousands, of years, and that they are only likely to be deficient in nitrogen, potash, phosphoric acid, and, in some cases, lime. This being so, for all practical purposes we can reduce our definition of manuring to "making good any deficiency of nitrogen, potash, phosphoric acid, or lime."

INFLUENCES OF THE VARIOUS FERTILISERS.

Although it is usually necessary to apply fertilisers which supply nitrogen, potash, phosphoric acid, and lime, if good results are to be secured for a long period of time, where intense culture is being practised, such as in market gardening, "home" gardens, and in "mixed" farming, some knowledge of the influences of each one of the principal commercial fertilisers is essential to ensure that it will be economically used for the different types of plants being cultivated.

Nitrogen.

Nitrogen is the plant food which encourages luxuriant growth in plants, and as such it must be present in adequate quantity for plants from which much leaf development is expected. The lack of nitrogen is often evidenced by poor, stunted growth, scanty foliage, and a general sickly yellow appearance, whereas an excess of nitrogen in the soil tends to increase the susceptibility of plants to disease. Nitrogen must be in combination before plants can use it, and as far as we know it must be combined up as a nitrate, otherwise it cannot be utilised. The soil bacteria, when properly encouraged, quickly convert other salts containing nitrogen into nitrates, particularly the ammonia salts, and slowly convert the nitrogen in organic matter, so

as to be available to plants. By providing a full supply of organic matter, and encouraging the activities of the soil bacteria, applications of nitrogenous manures can be done without. The common forms of fertilisers supplying nitrogen are:—

Nitrate of Soda.—This is ready for the use of plants as applied, so is a very quick-acting form of nitrogenous fertiliser, and as such is very suitable for use in cold, wet soils, where the bacteria are not very active. In heavy soils nitrate of soda has a bad effect on their mechanical condition by deflocculating the soil particles, thus making them very sticky; but this disadvantage can be overcome by using a mixture of half and half nitrate of soda and sulphate of ammonia, which should be applied as soon as mixed. Nitrate of soda is readily washed out of the soil, so should only be applied as a top-dressing after the plants have germinated. Owing to its quick action, an application to plants that have been checked in their early stages will almost invariably enable them to recover very rapidly. Applied to heavy land, it liberates potash for the use of plants.

Nitrate of Lime is quite equal to nitrate of soda as a fertiliser, providing that the same amount of nitrogen is applied, and has no ill-effect on the condition of the soil.

Sulphate of Ammonia.—This substance is next to the nitrates in regard to the quickness with which it acts, and although it has to be converted to nitrate before becoming available, it does not take a long time when conditions are favorable. Sulphate of ammonia has no bad effects on soil conditions, except to reduce the lime content, and leads to excessive acidity in those soils not naturally well supplied with lime. This substance is not leached out of the soil very readily until converted to nitrate.

Potash.

Potash appears to have special effect in encouraging the formation of the carbo-hydrates—sugars, starch, oils, &c.—and in promoting the growth of leguminous plants. As such, potash is a very important fertiliser for intense culture, because all the "root" plants, such as potatoes, onions, artichokes, dahlias, anemones, &c.; all the leguminous plants; all the fruits, especially the sweet ones; and all the nuts are particularly benefited by a plentiful supply of it. Potash also encourages extra vigor in plants, strengthens their stems, and tends to make them more resistant to diseases. Light, sandy soils contain but little potash, so applications of this fertiliser are quite essential if much growth is wanted. Heavy-textured lands, on the other hand, are usually rich in potash, and applications of nitrate of soda generally liberate enough potash for full plant growth. The appearance of red coloring along stem and leaves on plants that should be green, and when the points of the leaves tend to die back, as a rule denote an absence of sufficient potash in the soil. Where potash is difficult to obtain, applications of salt, lime, gypsum, or nitrate of soda liberate this substance from soils. Potassic fertilisers have a bad effect on the texture of soils by deflocculation of soil particles, due to the formation of potassium carbonate. All potassic fertilisers delay the germination of seeds, and retard the early growth of plants; so they should be applied to the soil about one month before seed is sown.

Muriate of Potash.—Muriate of potash is one of the principal forms of potassic fertiliser sold in this State, and originally only came from the Stassfurt mines in Germany, but is now being received from the French mines of Alsace as well. This fertiliser is the most concentrated form in which potash is applied, and in normal times is cheaper per unit than are the other forms. In appearance it looks like dirty, coarse, common salt of a yellowish color, and as such can be easily handled, and will mix well with the other common forms of fertilisers. It has a tendency to deplete the lime content of the soil, so should only be applied where plenty of lime is present. Muriate of potash can be used for all plants except the likes of tobacco, potatoes, onions, etc., where the chlorine which it contains is likely to injure the quality. This form of fertiliser should not be used on soils already oversupplied with chlorides, such as are many in low-rainfall districts.

Sulphate of Potash.—This form of potassic fertiliser is usually dearer per unit of potash than is the muriate of potash, but it can be used with safety for all plants, and also on soils rather low in lime content.

Kainit or Sylvinite.—Kainit, like the two previous potassic fertilisers, is also obtained from the Stassfurt mines, and is the most common product of those mines, whilst sylvinite is got in Alsace. It is a mixture of a number of salts, but mainly common salt and sulphate of potash, and is essentially a low-grade potassic fertiliser, taking three to four tons of this to supply as much potash as will one ton of muriate of potash. As it contains a lot of chlorides, the same restrictions to its use as for muriate of potash also apply. Further, it has to be applied to the soil so that it does not come in contact with the seed, because it seriously affects the germination of them. It is specially suitable to crops that originated near the sea, such as beets, asparagus, &c.

Phosphoric Acid.

But few soils of the world contain much phosphoric acid, and Australian soils are notably deficient in this plant food, and where intense culture is practised the supply of this substance is soon used up, and in consequence the making good of the shortage of phosphoric acid by applications of phosphatic fertilisers is found to be necessary fairly soon after the cropping of most soils has been regularly undertaken. A full supply of phosphoric acid in the soil plays a special part by stimulating early root development and promoting general vigor to plants in the early stages of growth, by tending to counteract any tendency to rankness, by promoting early maturity, and by tending to the development of flowers and seed rather than leaf and stem. Phosphoric acid is commonly found in the world in combination with lime, and it is usually as a form of calcium phosphate that it is used as a fertiliser, the well-known kinds being:—

Bonedust.—This consists of the ground bones of animals, and as the calcium phosphate in bones is in an insoluble form, this fertiliser must be finely ground if plants are to get much of the phosphoric acid in the year that it is supplied, and, failing this fine state of subdivision, it is but slowly available. Experience has shown that finely-ground steamed bones and bone flour are good phosphatic manures for light

soils poor in lime, such as sands and gravels, where much water is not used. Although bone products are good phosphatic manures, the user generally pays very dearly for his fertiliser, because the price per unit of fertilising material is much higher than can be obtained in other forms of phosphatic manures. The demand for ground bone is always greater than the supply, and appears to be caused by the prejudice in favor of this form of fertiliser, which has been handed down for ages by crop growers. For a very long period of time, and until comparatively recently, bones in some form were one of the few forms of manure used by crop growers which gave them big increases in yields, and despite the increased knowledge of plant requirements, and the discovery of fertilisers to supply the deficiencies of plant food, many users of phosphatic manures still pin their faith on bonedust, no matter what price they have to pay for it.

Basic Slag.—Basic slag is obtained in the manufacture of steel from iron containing phosphorus, by combining up this phosphorus with lime, after it has been removed from the iron. The slag obtained, to make a good fertiliser, must be so finely ground that at least four-fifths of it will pass through a sieve having 100 meshes to the inch, and, when so ground, this fertiliser is a very good form in which to apply phosphoric acid to heavy clayey soils where there is a good rainfall, or where irrigation water is applied. This fertiliser is not nearly so soluble as is superphosphate, but it contains a high percentage of free lime, making it very useful for some conditions. Unfortunately, in South Australia, much use cannot economically be made of this form of fertiliser, owing to the high price asked for it. In England it is found to be worth per unit of calcium phosphate about the same as the unit of calcium phosphate in superphosphate, but where special circumstances call for the use of basic slag to supply the phosphoric acid necessary, the value of the fertiliser naturally increases above the comparative value mentioned.

Superphosphate.—This is manufactured by treating insoluble calcium phosphates (either mineral or organic) with sulphuric acid, when the great bulk of the insoluble phosphate is made soluble in water. On practically all normal soils superphosphate is the most effective phosphatic fertiliser when equal amounts of phosphoric acid are compared, but for the full benefit to be received from applications of this fertiliser, the soil should contain an excess of lime (calcium carbonate), so that the free phosphatic acid which it contains combines with the lime; where sufficient lime is not present, the phosphoric acid combines with iron or aluminium, forming in some cases unavailable phosphates, and so much of the phosphoric acid may be lost to the plants which it is proposed to benefit. The soils in which applications of superphosphate do not give the full beneficial effect are light sands and gravels deficient in lime, peaty soils containing sour humus, and sour soils generally. The effectiveness of this form of phosphatic fertiliser seems to be due to the fact that, owing to its solubility when it is put in the soil, even though it reverts very quickly, it is deposited in a very fine state of division throughout the soil in the neighborhood of the roots of the plants. Superphosphate has a wonderful effect in promoting rapid root development, and so is especially valuable for

shallow-rooted plants, and short-lived crops which have to grow quickly. For the same reason it is very useful as an application in the early spring, to plants which have been badly checked in the winter, to give them a good quick start again.

Raw Rock Phosphate.—Deposits are found in various parts of the world containing phosphoric acid in large quantity, combined up mainly with calcium and to lesser extent with aluminium, and it is from the former—calcium phosphate—that the great bulk of the superphosphate is manufactured. Until comparatively recently but little of these mineral phosphates were used as fertilisers without treatment to change the form of phosphate, and the results secured when untreated phosphates (raw rock phosphates) were used, in most cases were poor; but it is now known that, providing the calcium phosphate is very finely ground, it makes a really good phosphatic manure for certain conditions. It is a matter of common knowledge that the use of superphosphate on sour soils does not reduce their acidity, and it is here that finely ground raw calcium phosphate is a suitable phosphatic fertiliser. As a general rule, it can be taken that finely ground raw rock phosphate can be used to advantage in sour soils, in peaty soils, where the rainfall is heavy, and where irrigation is practised. To make its use economical, it should be so finely ground that at least 60 per cent. is able to pass through a sieve with 100 meshes to the inch. Where nitrogen as well as phosphoric acid is to be applied, sulphate of ammonia and finely ground raw rock phosphate make a good mixture for the purpose, and the interaction between the two materials liberates the phosphoric acid more quickly than would otherwise be the case.

On the results being secured at Kybybolite Experimental Farm, it appears that finely ground aluminium phosphate is quite equal to finely ground calcium phosphate, at all events for top dressing pastures.

Lime.

Lime is so seldom absent from a soil, to the extent that plants cannot get enough for their proper growth, that it is hardly worth considering as a direct fertiliser. In some few cases, where organic manures are the only ones available, light applications of lime increase the growth of plants as the result of the plants being able to get their lime easily; but as these cases are so rare, and as lime is extremely important as an indirect fertiliser, it will be considered later under that heading.

COMPOUND FERTILISERS.

Of the common fertilisers providing more than one of the essential plant foods, the main ones are organic manures, and of them the following are the most important:—

Farmyard Manure.

This consists of the solid and liquid excrements, together with the bedding or litter provided, of the domesticated animals. On large holdings, where a lot of animals are kept, this consists

of a mixture of the droppings of different kinds of animals, but it often happens that the manure available is derived from only one class of animal, and is very often excreta only, without litter of any kind. Farmyard manure has the experience of ages in its favor, and by many is considered the all-in-all as regards manures, and although its direct benefit as a carrier of plant food is not so very wonderful, its indirect value makes it the most important of the manures. Although farmyard manure consists of plants, and contains the bulk of the substances originally in the plants, but in changed forms, still, when being applied as a fertiliser, it does not contain nearly as much of any of the principal plant foods as are required, nor are they in the correct proportions for plants, nor do they all become available with equal rapidity. One ton of farmyard manure contains about 12lbs. to 17lbs. nitrogen, 5lbs. to 9lbs. phosphoric acid, and 13lbs. to 15lbs. potash, of which the nitrogen and phosphoric acid are but slowly available, and for most crops it is found necessary, even when liberal applications of this manure are given, to reinforce it with nitrogenous and phosphatic fertilisers. It is quite a common practice in small gardens to use farmyard manure as a mulch, but unless the manure was well rotted before being used for such a purpose, it must be recognised that with such treatment the loss of nitrogen—the most expensive plant food that has to be supplied by growers—is fairly considerable. Farmyard manure should be put *in* the soil; any bulky organic matter, such as straw or the plants pulled from the garden, will make just as good a mulch as will the manure. Farmyard manure, in all of its various forms, has a very marked beneficial effect as a soil amendment, and as an indirect fertiliser; but this phase of its activities will be dealt with later on.

Horse Manure.—Horse manure is comparatively dry, and as such decomposes very rapidly, and so is more suited than are the wetter manures, to use in cold, wet soils. In its rapid decomposition much heat is given off, and so it is a good form of farmyard manure to use in hot beds and to force the growth of plants. To prevent loss by over decomposition, the heap of horse manure should be pressed together as much as is possible, and not allowed to become dry.

Cattle Manure.—This manure is wet and dense, and so decomposes slowly without the development of noticeable heat, and as such is a suitable manure to use on light sandy soils, and it can be depended on to have a lasting effect.

Pig Manure.—Pig manure is very similar to cattle manure in being moist, of slow decomposition, and in being suitable for light sandy soils. It is usually much richer than is the former, however, and so more valuable.

Sheep Manure.—This being dry, is, like horse manure, very easily decomposed, with the generation of much heat, and fills the same bill as does the horse manure, but is a much richer fertiliser, and is exceptionally well suited for the forcing of plants.

Bird Manure.—The droppings of the domesticated birds, particularly those of pigeons and fowls, are really well supplied with fertilising elements, and are suitable for application to all plants needing forcing.

Guano.

Guano consists of the partly decomposed droppings of birds, and in some few places has accumulated into huge deposits, which, in hot, dry places, have retained most of the original fertilising value of the droppings; it then is an extremely rich fertiliser. Unfortunately, nearly all of the deposits of good guano have been worked out, and the most of this material now put on the market is obtained from places where much of the nitrogen has been leached out, and the bulk of them are essentially phosphatic fertilisers, containing only a small percentage of nitrogen. Guano is a loose dry powder of a grey color in rich samples, becoming browner as the nitrogen contents get lower, and has a characteristic odor of ammonia. It is usually friable, and easy to distribute. A good guano is naturally a well-balanced manure, and the nitrogen is present in different forms, which take varying periods to become available, and so it is a safe manure to use for all crops, because it does not tend to over-stimulate plants in the same manner as do some active nitrogenous fertilisers. When obtainable at a reasonable price, a good guano is a most suitable manure for orchards and gardens, and for intense culture generally, particularly for use by individuals not thoroughly understanding manures and manuring.

Green Manuring.

Where the mechanical condition of the land is bad, or where the land is of low fertility, the putting into the soil of a bulky green crop of some kind is of great benefit. Whatever kind of crop is grown as a green manure, it must be turned under the soil at flowering time; if left longer, it becomes too woody, and the decomposition of it is delayed. Where nitrogen is lacking, a leguminous crop, such as peas, vetches, lupins, clover, &c., makes the best green manure crop, but where it is lack of organic matter and general poverty, any bulky crop that will decompose quickly serves the purpose.

Dried Blood.

Dried blood is almost essentially a nitrogenous manure, but it always contains some phosphoric acid. Originating as it does from slaughter-houses, dried blood frequently contains other substances, and so is not always of uniform composition, necessitating great care when purchasing it. It should contain from 9 to 14 per cent. of nitrogen, and as it undergoes fermentation very readily in the soil, it is one of the most valuable of organic manures, particularly as about 96 per cent. of its total nitrogen is available to plants in the year of application.

SOIL AMENDMENTS AND INDIRECT FERTILISERS.

Besides the materials already discussed, all of which are direct fertilisers, there are others which improve the soil texture, and liberate plant foods from unavailable forms, and as such are known as soil amendments or indirect fertilisers. The principal ones of these are farmyard manure, lime, gypsum, and salt.

Farmyard Manure as a Soil Amendment.

It has already been pointed out that farmyard manure is a very valuable direct fertiliser, but at the same time it is a very important material, in common with most bulky vegetable matter, for the amelioration of unfavorable mechanical conditions of soils, and in acting as an indirect fertiliser.

The value of farmyard manure in this direction is mainly due to the facts that (1) it improves the texture of all soils, by loosening heavy soils and making them more friable and open, and by more or less loosely binding light sandy soils; (2) most soils are improved by additions of organic matter in that their water absorbing and retaining powers are increased, and they are enabled to resist droughts or dry spells much better than are soils lacking in organic matter; (3) its decomposition in the soil increases the warmth of the soil, thus helping germination and growth generally, particularly in cold locations; (4) its decomposition in the soil leads to the liberation of other plant foods from their combinations with other substances; (5) the large quantity of carbonic acid gas liberated during its decomposition very considerably increases the solvent power of the soil moisture; (6) the addition of farmyard manure increases the activities of the useful soil bacteria; and (7) applications to those bare patches which appear when excess of sodium chloride reaches a dangerous degree of concentration tend to control this trouble.

Lime.

Lime is not only an essential plant food, but has a very marked effect on the mechanical condition of soils, and on the liberation of other plant foods from their unavailable combinations. When present in soils in large quantities, lower percentages of potash, phosphoric acid, and nitrogen are adequate for maximum growth, so that an application of lime, even when the soil is not deficient in this substance, to some extent does away with the need of applications of other fertilisers. The mechanical effect of lime on the soil is (*a*) to loosen heavy clayey soils by flocculating the particles, thus creating an artificial coarseness of texture, and (*b*) to some extent it tends to make loose sandy soil somewhat firmer, by acting as a weak cementing agent. Its effect on fertility is largely due to (1) its power of neutralising the acids formed in the soil; (2) its help in keeping up the warmth and moisture of the soil, so aiding bacterial action; (3) combining with the nitric acid formed by nitrifying bacteria; (4) encouraging the activities of all the nitrogen gathering bacteria, including the root-bacteria of the legumes; (5) the direct and indirect liberation of plant foods, mainly potash and phosphoric acid; (6) the rapid conversion of organic matter to humus, and the retention of the nitrogen in this humus; (7) its power of counteracting the injurious effects on plants of excesses of many of the soluble salts; and (8) its tendency to keep in check some of the plant diseases. As lime tends to sink rather quickly in the soil, it should always be applied directly on the surface, and be only worked into the surface soil, and for the same reason lime should be supplied frequently in small doses rather than in large doses once every few years, as was the practice in the past. A small dose every year, rather than heavy ones occasionally, is

very necessary where quicklime is used, because a big excess of quicklime has a temporary ill effect on the useful soil bacteria that should be encouraged. As the quicklime applied to soils is very quickly converted to calcium carbonate, it must be this latter substance that does the work in the soil, and experience has now shown that this is so; but to get results from calcium carbonate (limestone, chalk, marble, &c.) equal to those from quicklime, it is quite necessary to have it ground very finely, and then the choice between the two is only a matter of price. A comparison between values of limestone and lime can be arrived at by reckoning that for soil dressings 1 ton of finely ground limestone is equal in value to 12cwts. of the quicklime made from similar limestone.

Gypsum.

Sulphate of lime, or land plaster, benefits some plants to a remarkable degree, especially the legumes and such plants that are dependent on potash. Although this has been known for a long time, no explanation could be given, but it now appears to be wholly due to the liberation of potash in the soil, and analyses of leguminous plants grown with and without applications of gypsum always show but slight differences in the percentages of lime and phosphoric acid, but a very great increase in the potash content of the plants grown on the treated land. Besides liberating potash, gypsum aids in the decomposition of organic matter, and absorbs and retains volatile ammonium compounds. Like all other indirect fertilisers, gypsum should be applied in small doses often, rather than in big doses at long periods, because in the latter case it will possibly liberate more plant food than is necessary, and great losses may occur by leaching.

Salt.

In some places the use of salt, either alone or in admixture with fertilisers, is a common practice, and is usually applied to those plants that are supposed to have originated near the sea shore. Salt liberates potash, and, providing the rainfall is heavy enough, or irrigation is practised, applications of it benefit all plants needing much potash. It should never be used unless the water supply is good, because a concentration of this substance at the surface ruins the mechanical condition of the soil, and prevents seeds from germinating there.

"COMPLETE" MANURES.

A "complete" manure is generally recognised as one containing all three fertilising materials—nitrogen, potash, and phosphoric acid—in proportions to suit the crop to which it has to be supplied. As all classes of plants require different proportions of the various plant-foods, to get ideal results with the use of "complete" manures, a different mixture would have to be used for each class; but this is not a practical proceeding, and so these mixtures are made somewhere near what are the average requirements of plants, and then for special

cases additions are made of the extra plant foods required. The composition of various brands of "complete" manures vary considerably, but they usually contain:—

From 2½ to 5 per cent. of nitrogen.
From 8 to 15 per cent. of phosphoric acid.
From 2 to 7 per cent. of potash;

and then for special conditions either more nitrogen, potash, or phosphoric acid must be added to the soil.

QUANTITIES OF FERTILISERS TO APPLY.

It is impossible to state definitely what quantity of any given fertiliser should be applied to a particular crop, because the amount required will depend very largely on the fertility of the soil, on the climatic conditions of the district, and on the system of cropping being practised. Most of the cultivated crops are habitually grown on soils of many different types, which on analyses and on cropping results show various degrees of fertility, and soils belonging to the one class vary in their powers of recuperation. The climatic conditions obtaining affect the potential capabilities of soils, and with any given type of soil it would not be economically correct practice to use equally heavy dressings of fertilisers where these soils are situated in unfavorable climatic conditions, as where the natural conditions are conducive to good growth. The system of cropping being followed plays a large part in the quantity of fertiliser applied to the various crops, because in a rotation of crops, which includes a number of different classes of plants, it is often good practice to manure one crop heavily for the benefit of the succeeding crop, and the type of crop preceding the one to be considered will also affect the manuring.

FERTILISERS FOR INTENSE CULTURE.

For manuring when intense culture is being practised, such as in market gardens and many "home" gardens, where the whole land is covered with plants (many of which make very strong growth), and where the land carries a heavy growth of plants most of the year, it must be remembered that, if the fertility of such land is to be kept up so that these big crops can be carried for a long period of time, at least as much plant food must be put back into the soil as is taken out by the plants. To be able to do this, some idea must be gained of the amounts which plants remove of those foods likely to become deficient in most soils, and in this connection the following figures can be taken as the approximate average amounts taken by an assortment of ordinary garden plants:—

Nitrogen—About 50lbs. per acre, or 2½ drams per square yard
Phosphoric Acid—About 20lbs. per acre, or 1 dram per square yard
Potash—About 50lbs. per acre, or 2½ drams per square yard.

Some of the plants commonly grown take much more of all of the plant foods than the above figures; others, of course, much less; but if these quantities are taken as a minimum, and are replaced each planting, sufficient plant food will be in the soil to produce good growth for a very long period of time. Of the common forms of

fertilisers obtainable at present, and safe to use in average conditions the amounts necessary to replace the removals will be:—

250lbs. sulphate of ammonia (20 per cent.) per acre, or 13 drams per square yard.

121lbs. superphosphate (36 per cent.) per acre, or 6½ drams per square yard.

96lbs. muriate of potash (52 per cent.) per acre, or 5 drams per square yard.

And, because of the fact that in most cases where such very intense culture is practised, the areas utilised are comparatively small, it is perhaps well to know that:—

One teaspoonful of most fertilisers equals about ½oz., or 8 drams.

One dessertspoonful of most fertilisers equals about 1oz., or 16 drams.

One tablespoonful of most fertilisers equals about 2ozs., or 32 drams.

To be able to put on the land a manure containing the three fertilising materials, will naturally simplify the operation, and it can be done, but it must always be remembered that most nitrogenous fertilisers are very liable to be washed out of the soil, and so best results are usually obtained by adding the other two ingredients and some of the nitrogen in a mixture, and then make up the necessary amount of nitrogen in two or three extra applications during the growth of the plants. Again, in all soils, except light sands, it is rarely necessary to make good all of the potash taken out of the soils by plants, because most Australian soils are well supplied with potash, but it is only slowly available, and there is usually too little of this substance liberated in one year to make good all taken out of the ground, and so it remains necessary to add some potash. For most plants the following mixture—

Superphosphate (36 per cent.), 2 parts,
Sulphate of ammonia (20 per cent.), 1 part,
Muriate of potash (52 per cent.), 1 part,

applied at the rates of 300lbs. per acre, or 1 oz. (2 teaspoonsful) to the square yard every planting, will give good results on all soils well supplied with lime and organic matter, providing that sulphate of ammonia is applied at the rate of ½cwt. per acre, or 3 drams (about ½ teaspoonful) to the square yard, twice during the growth of the plants.

To insure success where very heavy and varied cropping is practised (market gardens, "home" gardens, &c.), the following additions should be made to average soils, with extra of some of the fertilisers for special purposes:—

10 tons to 20 tons per acre of well-rotted farmyard manure every second year, or 5lbs. to 10lbs. per square yard.

5cwts. lime per acre every second year, or 2oz. per square yard.

Phosphatic fertiliser containing about 50 lbs. of phosphoric acid per acre annually, as is contained in 2cwt. superphosphate (45 per cent.), equalling about 3 drams of phosphoric acid per square yard, or 12 drams of superphosphate (45 per cent.).

Potassic fertiliser containing about 78lbs. of potash per acre annually, as is contained in 150lbs. muriate of potash (52 per cent.), equalling about 4 drams of potash per square yard, or 8 drams of muriate of potash (52 per cent.).

Nitrogenous fertiliser containing about 45lbs. of nitrogen per acre annually, as is contained in 2cwts. sulphate of ammonia (20 per cent.), equalling about 2½ drams of potash per square yard, or 12 drams of sulphate of ammonia (20 per cent.).

In soils of heavy texture the amount of lime used should be increased, whilst the application of potassic fertiliser can be reduced, and some of the phosphoric acid can be supplied in raw rock phosphate. Smaller dressings of lime can be used in light, sandy soils, but the amount of potash should be increased, and in some cases the nitrogenous manures used should be greater, and bonedust at a reasonable price can replace some superphosphate. In calcareous soils the quantity of lime can be considerably reduced, and an increase in the amount of potash is often advantageous. In peaty soils the farmyard manure can be omitted, the dressing of lime and potash increased, and the nitrogen reduced.

MANURING OF CEREALS.

The cereals commonly grown in Australia—wheat, oats, and barley do not remove large quantities of mineral matters from the soil, when compared to many other types of crops, and of the three important substances, they utilise more nitrogen than potash or phosphoric acid, yet in the vast majority of places where these crops are grown, we have not yet found it necessary to fertilise the cereals with anything other than phosphates. Owing to the comparative "newness" of our soils, and because of the fact that much nitrogen is collected from the air by bacteria in the soil, during the process of fallowing the land, we have not yet been able to secure sufficient profits to be worth consideration, from applications of nitrogenous fertilisers to the cereals grown on fallowed land, and the vast majority of our crops are grown with this soil preparation. Australian soils are, on the average, notably rich in potash, and dressings of manures containing this plant food are usually quite unprofitable. Neither nitrogen nor potash being necessary additions to our cereal crops to enable farmers to secure adequate profits, in most cases it only remains to add phosphoric acid, and this has now become the general practice of the country, and as most of the soils on which cereal growing is the recognised crop-producing activity are normal for mineral plant foods other than phosphoric acid, superphosphate naturally gives best results of all phosphatic fertilisers. In the cereal-growing districts, which have been settled long enough to enable farmers to clear the land of stumps and stones, applications of from ¾cwt. to 1cwt. superphosphate (36 per cent.) per acre are the rule, but because of the

fact that a 20-bushel crop of wheat, and its equivalent of oats or barley, will utilise all of the phosphoric acid supplied in 1cwt. superphosphate (36 per cent.), this should be considered as the minimum application of phosphatic fertiliser. If the fertility of the land is to be maintained, even for a limited period of time, at least 1cwt superphosphate (36 per cent.) per acre should be used with every cereal crop grown, but if this fertility is to be increased under the more diversified farming system of "cereals and livestock," which inevitably follows the system of "bare fallow-wheat-bare fallow-wheat" common in districts whilst the scrub is being controlled, more than this minimum must be provided, and the extra amount used must be sufficient to more than compensate the quantity of phosphoric acid removed by the pasture plants following the cereal crops, and carried off by livestock.

In a general way it may be advised, that all cereal crops grown on average soils should be dressed with at least the equivalent of 1cwt superphosphate (36 per cent.) per acre, and when any cereal crop is to be followed by pasture, or another crop not to be manured, the dressing of superphosphate should be increased to 2cwts. per acre.

In districts where rotations such as (*a*) bare fallow—wheat—pasture, or (*b*) bare fallow—wheat—oats, or (*c*) bare fallow—wheat—barley, or (*d*) bare fallow—wheat—oats (barley)—pasture are practised, it appears at present that it will be a long time before any other fertiliser but superphosphate will be necessary, and that when additions are required, they will possibly be applications of ½cwt. nitrate of soda or sulphate of ammonia to the second cereal crop.

Where rotations such as peas—wheat—oats (barley)—potatoes are practised, particularly when the potato crop receives farmyard manure, no fertilisers except phosphates are at present required by the cereals, but where simple rotations like peas—wheat—oats are the rule some nitrogen given to the second cereal is advantageous.

MANURIAL DRESSINGS FOR LEGUMINOUS CROPS.

Well-grown leguminous crops, such as lucerne, peas, clovers, beans etc., collect more of the mineral matters from the soil than do the cereals; still, in most places where these crops are successfully grown in Australia, to date it has only been necessary to add phosphatic fertilisers to them. The requirements of these crops of potash and lime are great, although in most places applications of potassic fertilisers have not proved profitable, but additions of lime are usually beneficial in the districts where peas, clovers, and beans can be successfully grown under natural conditions.

Lucerne only grows really well where the soils are well provided with lime, and then only requires the addition of the equivalent of 2cwts. superphosphate per acre per year to give heavy returns. When being grown in soils rather deficient in lime, as are most of our soils in districts receiving more than 20in. average rainfall, a dressing of 2 tons of slaked lime per acre should be applied before seeding the crop, and an application of from 10cwts to 1 ton be given every four years.

Most of the other leguminous crops are usually grown in those districts receiving an average annual rainfall of from 20in. upwards, and so are usually improved by dressings of lime as well as phosphatic fertilisers, and the addition of 10cwts. lime per acre once every four years to the rotation in which the legumes are grown, as well as from 1½cwts. to 2cwts. superphosphate per acre with the leguminous crop, will at present give very profitable crops.

FERTILISING ROOT CROPS.

The root crops, including such crops as cabbages, kale, silver beet, etc., are greedy feeders, as is to be expected from the great bulk of growth made, and they remove much mineral matter from the soil.

Where at all possible, applications of farmyard manure should be made to land which is to carry a root crop, and if this is supplemented by fairly heavy applications of fertilisers carrying mineral matters, very large crops can be secured. If a dressing of 20 tons farmyard manure per acre is given to the land before seeding to a root crop, 2cwts. superphosphate per acre, and 1cwt. nitrate of soda should suffice, but failing the farmyard manure, at least 10cwts. lime per acre should be applied once every four years to the rotation, and the root crop should receive 3cwts to 4cwts. superphosphate, and 1½cwts. of a nitrogenous fertiliser per acre. Failing this form of manuring, the crop should receive 7cwts. to 8cwts. of superphosphate per acre. In some manurial experiments on potatoes, grown in a rotation, which received 10cwts. lime per acre once in four years, which were conducted for some years at Mount Barker, South Australia, the plots receiving (*a*) 8cwts. superphosphate per acre, and (*b*) 4cwts. superphosphates and 2cwts. dried blood per acre, gave about equal profits for the manuring, and these were much higher than for any other form of manuring.

MANURES FOR OTHER SUMMER CROPS.

The summer crops making very rapid growth in the hot part of the year, such as maize, sorghum, millet, sunflowers, etc., require really fertile soils, or the application of active forms of the various fertilisers, if they are to make the luxuriant growth of which most of them are capable.

When grown for forage purposes, the rotation of which one of these crops forms a part should receive an application of farmyard manure at the rate of 20 tons per acre once in four years or so, applied in preparing the land for the summer crop, and at the time of seeding a dressing of 2cwts. to 3cwts. superphosphate per acre should also be given. When insufficient farmyard manure is available, a nitrogenous fertiliser should be used as well as the phosphate, such as 1cwt. to 1½cwt. of nitrate of soda or sulphate of ammonia.

When grown for grain, the same luxuriance of growth is not required, still some farmyard manure is helpful, but in most fairly fertile soils, a dressing of 2cwts. to 3cwts. per acre of superphosphate will be all that is required, providing that the one type of crop is not grown too often on a given block of land.

In heavy clayey soils, and in those that are peaty, applications of lime aid these crops to a great extent, and such lands should receive a 10cwts. dressing once in four years.

MANURING PASTURES.

In those countries where pasture lands are well cared for, and where much work has been done in manuring experiments, it is becoming recognised that the manuring of pastures is a much simpler operation than was considered necessary until fairly recently, and for the majority of cases it can be stated that the manuring of pastures consists in supplying phosphoric acid, and in some few cases, lime. A good growth of pasture plants, whether in sown or "natural" pasture, will utilise all of the phosphoric acid available in a dressing of 1cwt. superphosphate per acre, so all pasture lands should receive the equivalent of at least 1cwt. superphosphate per acre per year. It is a proved fact in the handling of pastures, that more economical results are secured from the use of fertilisers if heavy applications are given seldom, rather than light applications often, and this is particularly so in Australia where most of our soils are rather deficient in phosphoric acid. At present prices of phosphatic fertilisers it is much more economical to apply a mixture of 1cwt. superphosphate (45 per cent.) and 10cwts. raw rock phosphate (82 per cent.) per acre once every 12 years to 15 years, rather than to annually distribute 1cwt. superphosphate per acre, and the grazing returns will be greater, especially in the first few years after commencing manuring.

In districts with fairly fertile soils, and where an average annual rainfall of 22in. or more is received, pasture lands should be dressed with the equivalent of from 1½cwts. to 2cwts. of superphosphate per acre per year.

In soils very deficient in lime, in heavy clays, and in peats, a dressing of at least 10cwts. per acre of lime should be given once in every four years, as well as the phosphatic manures.

In European countries, basic slag is the phosphatic fertiliser which gives best results on most pasture lands, and particularly so on heavy, wet, clay soils, but in Australia this phosphate is much more expensive than its agricultural value warrants, and providing that raw rock phosphate is finely ground, it gives quite good returns when sufficient rainfall is received.

FERTILISERS FOR FRUIT TREES AND VINES.

A considerable amount of experimental work in the fertilising of fruit trees and vines has been carried out in most countries where these crops are grown at all extensively, but the results secured are so contradictory that it is quite impossible to lay down any hard and fast rules for manuring them. In most countries, few manuring tests have shown direct profits, except for peaches and grape vines, and the outstanding need of peach trees appears to be nitrogen, whilst vines usually show an improvement when fertilisers containing nitrogen, potash, and phosphoric acid are provided.

Young trees and vines usually show a marked improvement when regularly manured, and for average conditions a fertiliser containing the following proportions of the required plant food is suitable:—

Nitrogen	5 per cent.
Potash	6 „ „
Phosphoric acid	6 „ „

Such a fertiliser would be made by utilising:—

150lbs.	Sulphate of ammonia
220lbs.	Superphosphate (36 per cent.)
90lbs.	Sulphate of potash
140lbs.	Sand
600lbs.	Total;

and should be applied at the rate of 6lbs. per tree, or 1lb. to every 8 sq. yds. for vines, preferably in two applications rather than putting the whole lot on the land at one time.

Old fruit trees and vines that are in need of manuring usually require different proportions of the fertilising materials, and a mixture which often proves satisfactory is one containing:—

Nitrogen	3 per cent.
Potash	12 „ „
Phosphoric acid	12 „ „

This can be made by using:—

150lbs.	Sulphate of ammonia
550lbs.	Superphospate (45 per cent.)
300lbs.	Sulphate of potash
1,000lbs.	Total;

and should be applied at the rate of about 10lbs. per tree, or 1lb. to every 5 sq. yds. of vineyard

In all soils not really rich in organic matter, it is good practice and almost a necessity to apply organic matter to the orchard or vineyard if maximum returns are to be secured. In a country like Australia, where farmyard manure is difficult to obtain, the best way to provide this organic matter, and at the same time to fertilise the land, is to grow leguminous crops between the rows of trees or vines, and plough the growth made into the land. For the purpose, tick or horse beans, and field peas, are very suitable crops, and if sown with a dressing of 3cwts. of superphosphate per acre, and ploughed into the soil at flowering time, a very marked improvement to the mechanical condition of the soil and to the growth of the trees or vines is the result. This green manuring is a necessity in sandy soils, particularly where irrigation is practised, and greatly improves soils of heavy texture.

MANURES FOR SPECIAL PURPOSES.

In connection with the use of manures, where a big variety of plants is grown it must be remembered that although the use of the mixture already mentioned under the heading of "Fertilisers for Intense Culture" will prevent the fertility of the soil becoming too low, for maximum results special plants need special treatment. In this connection the following facts should not be lost sight of:—

Phosphoric acid must be put into the soil for all plants, because practically no soils are naturally well supplied with this plant food.

Nitrogen encourages luxuriant growth, and so all plants having greatest value in their leaves and stems should be well supplied with nitrogenous fertiliser.

Potash promotes the formation of flowers, seeds, bulbs, fruits, nuts, etc., and adds to the general hardiness of plants.

A plentiful supply of *organic matter* and *lime* in the soil allows plants to make maximum growth with less manure, because the bacteria increase their activities and liberate much nitrogen, and lime frees some of the potash held in combination.

AIDS TO SUCCESSFUL MANURING.

Manuring of plants is only one of the necessities tending towards full returns, and without the others would be useless, and further, the better the other conditions the greater will be the effects of the fertilisers.

The soil must be well supplied with organic matter to keep it in good mechanical condition, to control the moisture and warmth, and to make it a suitable medium for bacteria to live in.

The soil must be well supplied with lime to counteract excessive acidity, encourage bacteria, and liberate other plant food.

The soil must be well drained, otherwise water keeps it cold, prevents the easy access of air, and does not allow the roots of plants to travel far in search of their requirements.

The soil must be kept well aerated as the roots of plants are in need of air, so are the bacteria, and this supply of air does much towards the liberation of plant foods.

The soil must be well supplied with water by rain or artificial irrigation, otherwise plants cannot make full use of their opportunities.

Liquid Manure.

The liquid manure obtained by collecting what drains away from the farmyard manure heap, or made by steeping animal droppings in water, is a stimulant for many kinds of plants grown in market and "home" gardens, and should be well diluted and applied at the rate of about a gallon to every sq. yd.

A good liquid manure for forcing plants can be made with mineral fertilisers by thoroughly mixing:—

1½ozs. superphosphate,
½oz. sulphate of potash,
1½ozs. nitrate of soda,

in a full kerosine tin of water, and applying it to every 3 sq. yds. to 4 sq. yds. of garden.

Mixing Fertilisers.

All fertilisers cannot be mixed indiscriminately without in some cases incurring losses of available plant food or affecting the mechanical condition of the mixture. Some mixtures lead to trouble in one of the following directions:—(1) Loss of nitrogen in ammonia, (2) reversion of soluble phosphates, (3) by producing unfavorable mechanical condition. In this connection it is always to be remembered that the following of the fertilisers, obtainable in South Australia, should never be mixed:—

Lime and nitrate of lime must not be mixed with—

Sulphate of ammonia.	Superphosphate.
Nitrate of soda.	Animal manures.
Muriate of potash.	Guano.
Kainit.	

Basic slag must not be mixed with—

Sulphate of ammonia.	Guano.
Animal manures.	

UNIT SYSTEM OF VALUING FERTILISERS.

Fertilisers are usually valued on what is known as the unit system, and in this method a unit of any of the fertilising materials is taken as 1 per cent. per ton. For instance, the sulphate of ammonia at present on the market contains 20 per cent nitrogen, which means that 1 ton of sulphate of ammonia contains 20 units nitrogen, and, as this material costs £19 per ton, each unit of nitrogen in the sulphate of ammonia is worth 19s. The same method of valuation applies to all fertilisers, and as it is compulsory for manure merchants to show the analysis of every manure for sale, a knowledge of unit values of the fertilising materials will enable the user to know exactly what he is paying for the part of the fertiliser useful to him.

Unit Values in South Australia.

Based on the actual prices to be paid for some of the fertilising materials in Adelaide at the present—1924—the following list of unit values has been built up, and from it the comparative values of most of the manures on our markets can be calculated:—

Agricultural Unit Values of Fertilisers.

Plant Food.	Unit.	Value of Unit. £	s.	d.	Remarks.
Phosphoric acid ..	Water soluble calcium phosphate	0	2	1	Actual cost in 46 per cent. super.
	Citrate soluble phosphate.....	0	2	0	—
	Acid soluble phosphate.....	0	1	1½	Actual cost in 82 per cent. raw rock phosphate.
	Acid soluble phosphate.....	0	1	7½	In organic manures as bones, &c.
	Total phosphate in basic slag ...	0	1	11	—
Nitrogen	In Nitrate of soda	1	3	0	—
	Nitrate of lime	1	4	0	—
	Sulphate of ammonia	0	19	0	Actual cost in 20 per cent.
	Blood	1	4	0	—
	Bonedust, &c.	1	4	0	—
Potash	In Muriate of potash	0	5	0	—
	Sulphate of potash	0	7	5½	Actual cost in 45·6 per cent.

The unit value, of course, changes with the fluctuations of the market, but can always be brought up to date by comparisons with actual cost of the various plant foods at any given time. The commercial value is governed by a law of supply and demand, but the agricultural value is not always synonymous with commercial cost, and so every plant grower has personally to decide what will give the biggest profit in his particular conditions, and then, despite the average agricultural value, such fertilsers will be the cheapest for him.

In connection with the above unit values, some manure analyses show nitrogen as its equivalent in ammonia, but it is easy to correct the valuation figures when it is known that 17 units of ammonia equal 14 units of nitrogen.

Comparison of Nitrogenous Fertilisers.

Many experiments have been conducted, testing the availability of the nitrogen in various nitrogenous manures, which affect their unit values, and the results obtained show that when an equal quantity of nitrogen is supplied in the following fertilisers, plants have the power of utilising the amounts set alongside them, compared to 100 for nitrate of soda:—

Nitrate of soda	100
Nitrate of lime	100
Sulphate of ammonia	94
Blood	73
Bone meal	65
Farmyard manure	45

On these figures, the nitrogen in blood and bone dust would be of much lower unit value than in the mineral forms, but cropping experience proves their values to be quite as high as the best of the other nitrogenous fertilisers, and further, the advantage to manure manufacturers of being able to use these substances for their special mixtures is so great that the price of the nitrogen they contain is usually very high.

UNIT COSTS OF SOME PRESENT OFFERINGS, ADELAIDE—1924.

Potassic Fertilisers.

Fertiliser.	Per Cent. Potash.	Cost Per Ton.	Unit Cost.	Unit Cost in England, December, 1923.
		£ s. d.	£ s. d.	£ s. d.
Sulphate of potash	45·6	17 0 0	0 7 5½	0 4 6
Muriate of potash	50·0	16 0 0	0 6 5	0 2 10

Nitrogenous Fertilisers.

Fertiliser.	Per Cent. Nitrogen.	Cost Per Ton.	Unit Cost.	Unit Cost in England December, 1923.
		£ s. d.	£ s. d.	£ s. d.
Nitrate of soda	15·50	18 10 0	1 3 10½	0 16 11
Nitrate of lime	12·75	12 10 0	0 19 7½	0 19 3
Sulphate of ammonia	20·00	19 0 0	0 19 0	0 13 1
Blood manure	8·00	12 15 0	1 11 10½	—

Phosphatic Fertilisers.

Fertiliser.	Per Cent. Calcium Phosphate.	Kind of Phosphate.	Cost Per Ton. £ s. d.	Unit Cost. £ s. d.	Unit Cost in England, December, 1923. £ s. d
46 % superphosphate .	46	Water soluble	4 16 6	0 2 1	—
45 % superphosphate .	45	Water soluble	4 15 0	0 2 1½	—
36 % superphosphate .	36	Water soluble	4 5 0	0 2 4½	0 1 10
30 % superphosphate .	30	Water soluble	4 0 0	0 2 8	0 2 0
82 % raw rock phosphate	82	Acid soluble	4 12 6	0 1 1½	—
57 % raw rock phosphate	57	Acid soluble	3 10 0	0 1 2½	—
Basic slag	31	Total	6 5 0	0 4 0½	0 1 11

Compound Fertilisers.

Manure.	Cost per Ton. £ s. d.	Fertilising Constituents.	If Unit Value is £ s. d.	Unit Cost will be £ s. d.
(*a*) Bonedust	8 0 0	Nitrogen, 3·25 %	1 4 0	—
		Acid soluble phosphate, 40 %..	—	0 2 0½
(*a*) Bonedust	8 0 0	Acid soluble phosphate, 40 %..	0 1 8	—
		Nitrogen, 3·25 %	—	1 8 8½
(*b*) Bone manure	9 5 0	Nitrogen, 4·5 %	1 4 0	—
		Acid soluble phosphate, 32 %..	—	0 2 5
(*b*) Bone manure	9 5 0	Acid soluble phosphate, 32 %..	0 1 8	—
		Nitrogen, 4·5 %	—	1 9 3
(*c*) Orchard manure...	7 5 0	Nitrogen, 1·5 %	1 4 0	—
	—	Potash, 4·5 %	—	0 9 2
		Water soluble phosphate, 20 %	0 2 3	—
		Citrate soluble phosphate, 8 %	0 2 0	—
		Acid soluble phosphate, 4 % ..	0 1 8	—
(*c*) Orchard manure...	7 5 0	Nitrogen, 1·5 %	—	1 12 0½
		Potash, 4·5 %	0 6 6	—
		Water soluble phosphate, 20 %	0 2 3	—
		Citrate soluble phosphate, 8 %	0 2 0	—
		Acid soluble phosphate, 4 % ..	0 1 8	—
(*c*) Orchard manure...	7 5 0	Nitrogen, 1·5 %	1 4 0	—
		Potash, 4·5 %	0 6 6	—
		Water soluble phosphate, 20 %	—	0 2 10
		Citrate soluble phosphate, 8 %	0 2 0	—
		Acid soluble phosphate, 4 % ..	0 1 8	—
(*c*) Orchard manure...	7 5 0	Nitrogen, 1·5 %	1 4 0	—
		Potash, 4·5 %	0 6 6	—
		Water soluble phosphate, 20 %	0 2 3	—
		Citrate soluble phosphate, 8 %	—	0 3 6
		Acid soluble phosphate, 4 % ..	0 1 8	—
(*c*) Orchard manure...	7 5 0	Nitrogen, 1·5 %	1 4 0	—
		Potash, 4·5 %	0 6 6	—
		Water soluble phosphate, 20 %	0 2 3	—
		Citrate soluble phosphate, 8 %	0 2 0	—
		Acid soluble phosphate, 4 % ..	—	0 4 8

CONVERSION TABLE FOR FERTILISERS

The ingredients of fertilisers of most importance to plant growers are nitrogen (N), potash (K_2O), and phosphoric acid (P_2O_5), and when estimating the value of any particular manure, the figures showing the fertilising constituents should be converted to these substances, no matter how they may be expressed in the analysis supplied with

the manure, but as it has become customary to express the phosphoric acid content as tri-calcic phosphate (acid soluble phosphate), or as so much tri-calcic phosphate converted into another form, only the compounds of nitrogen and potassium are converted back to the plant foods, and phosphatic fertilisers are valued on their calcium phosphatic content. To help in converting the figures supplied in analyses of fertilisers back to the substances generally used for valuating purposes, the following figures are useful:—

Conversion Table.

To Convert	Into	Multiply by
Ammonia	Nitrogen	0·824
Sulphate of ammonia	Nitrogen	0·212
Nitrate of soda	Nitrogen	0·165
Nitrogen	Ammonia	1·214
Nitrogen	Sulphate of ammonia	4·714
Nitrogen	Nitrate of soda	6·071
Ammonia	Sulphate of ammonia	3·882
Sulphate of ammonia	Ammonia	0·257
Ammonia	Nitrate of soda	5·000
Nitrate of soda	Ammonia	0·200
Phosphoric acid	Tricalcic phosphate	2·183
Tricalcic phosphate	Phosphoric acid	0·458
Sulphate of potash	Potash	0·540
Muriate of potash	Potash	0·630
Potash	Sulphate of potash	1·850
Potash	Muriate of potash	1·585
Carbonate of lime	Lime	0·560
Lime	Carbonate of lime	1·786

GOVERNMENT EXPERIMENTAL FARM, KYBYBOLITE.

FODDER CROPS UNDER IRRIGATION.

The underground water supplies available in the Kybybolite district have been utilised at the Government Experimental Farm, Kybybolite, for the purpose of producing summer crops, and thus demonstrating the advantages of these crops in districts in which the production of winter crops is problematical, and likely to fail in two seasons out of five. The 1922-23 irrigation cropping at this farm is reported on by the Manager (Mr. L. J. Cook) as follows:—

IRRIGATION EXPERIMENTS AT KYBYBOLITE EXPERIMENTAL FARM, 1922-23.

During 1922 a third area of approximately 3½ acres was graded and prepared for irrigation cropping, bringing the total acreage under irrigation to about nine acres. The whole area was sown to maize and sorghum varieties for grain production.

SEASONAL NOTES, 1922-23.

The months of September and October, 1922, were comparatively wet, over 2½in. of rain being distributed over each month. This prevented the heavy soil of the irrigation area being ploughed and worked to a suitable tilth until well towards the end of October, and delayed planting until the first week in November. Only 32 points of rain were registered during November; hence it was found necessary to give the first irrigation at the close of that month. Good rains fell during December, but these brought cold conditions with them, which considerably checked the growth of such warmth-loving plants as maize and sorghum. January, February, March, and April (1923) were very dry, registering only 70 points of rain during the four months, necessitating an average irrigation during January, and a heavy one during February, when the plants were making their greatest growth. The late summer enabled the plants to ripen their grain satisfactorily, but it was well along in May before some of the plots were ripe.

SORGHUMS.

Block A.

This section of the irrigation area produced a yield of 62bush. of maize per acre during 1921-22. The stubbles were raked and burnt and soil ploughed during the second week of October. It was rolled cultivated, and harrowed several times until the bulk of soil was in a suitable tilth for sowing. On November 4th and 6th the block was sown with 11 varieties of sorghums, the seeds of which had just recently been received from the United States Department of Agriculture, and represented selections of their latest types of these crops. Small plots of each variety were sown, with a small plot of maize be

twice each, to avoid unnecessary cross fertilising of the varieties. The seeds were sown in furrows 40in. apart, and 6in. to 8in. apart in the rows. The land was harrowed after the seed was sown, and 1cwt. mineral superphosphate per acre was drilled across the area. This block had received a good dressing of farmyard manure during 1921. None of the varieties germinated really well; especially along the northern end of the area, where the soil is very stiff and tenacious, and such that it is practically impossible to work it into a really good filth, was germination defective. Spaces were resown during December. *The first irrigation was given between November 29th and December 2nd. Very little growth was made during the cold* December period. The second irrigation was given on January 11th and 12th, and the third between February 10th and 13th.

The rows were cultivated as soon as possible after each watering, or heavy rain, and again a week or so later to check weed growth, and prevent undue evaporation. The three irrigations were quite sufficient to mature the grain of the ordinarily sown sorghum, but water was again applied to the area in March and April to enable berseem to be sown, and grown in amongst the rows of sorghums and maize. These late waterings affected all varieties of sorghums, producing a lot of secondary growths, and immature, unfertilised seed heads. During March and April the northern ends of the sorghum plots, which were carrying an irregular growth, due to the re-sowing, were cut and fed to milch cows. As the crops had been sown thin, and not with the idea of producing green forage, an accurate weight of forage cut was not taken; but approximately 7 tons were cut from about ¼ acre.

The grain of sorghums was ready for harvesting in May, but on account of pressure of work with the ordinary farm seeding, the irrigation fields were not harvested until June.

On June 8th the heads of sorghums were gathered by cutting them off with secateurs, and thoroughly dried under cover. They have subsequently thrashed in the stripper drum, and winnowed.

The following table shows the actual quantity of water received by Block A whilst the sorghums were growing and ripening their grain. It must be remembered that the March and April waterings were not necessary to the sorghum, but were given for berseem cultivation.

Moisture Received by Maize and Sorghums, Block A, 1922-23.

Date.	Rainfall. inches.	Irrigations. acre-inches.	Totals. acre-inches.
1922—			
November	0.32	3.01	3.33
December	2.81	—	2.81
1923—			
January	0.39	3.04	3.43
February	0.31	4.21	4.52
March	0.01	4.35	4.36
April	0.00	2.67	2.67
Totals	3.84	17.28	21.12

The following table shows the yields of grain received from the sorghum varieties. The bushel weight of sorghum has been taken at 60lbs.

Grain Yields of Sorghums Under Irrigation, Kybybolite, 1922-23.

Variety.	Area. acres.	Total Yield. lbs.	Yield Per Acre. bush. lbs.
Red Amber Sorgo	0.044	170	64 24
Pink Kafir	0.058	222	63 48
Dawn Kafir	0.058	206	59 12
Black Amber Sorgo	0.055	193	58 29
Sunrise Kafir	0.056	191	56 51
Feterita	0.062	189	50 48
Dwarf Yellow Milo	0.062	173	46 39
Early Sumac Sorgo	0.028	74	44 3
Kansas Orange Sorgo	0.045	88	32 35
Dwarf Hegari	0.050	88	29 20
Freed Sorgo	0.047	53	18 48
Totals	0.565	1,647	48 35

Three distinct types of growths were amongst the above; the fir- Sorgos made a lot of tall stalk and leaf growth, and undoubtedly produced the best and greatest quantity of green forage. They have a sweet stalk, and much resemble early amber cane in appearance. The three Kafirs produced a medium growth of stalk with plenty of leaves, and, as the above table shows, they all produced a good quantity of grain. They appear to be useful for either grain or forage production. The varieties, Feterita, Dwarf Milo, and Dwarf Hegari, made short, poor forage growth, but produced a very fine large sample of grain. Observations on the individual characters of each variety are as follows:—

Red Amber Sorgo.—Made a fairly quick growth, averaging approximately 5ft. 6in. in height, with 12 to 14 stools on representative plants. Headed well, in loose panicles, producing red grain of similar nature to ordinary amber cane. Good samples averaged 1.96oz. grain per head.

Pink Kafir.—Made a comparatively large amount of leaf growth, and stooled well, representative plants being 4ft. 6in. high, with 10-12 stalks. It headed particularly well, producing long, cylindrical heads, containing comparatively small, round grains. Good samples averaged 2.9oz. grain per head.

Dawn Kafir.—Much like the Pink variety in growth, except about 6in. shorter. Stooled quite as well, and headed well, but not so long or attractive in appearance. Good samples averaged 2.5oz. grain per head.

Black Amber Sorgo.—The earliest maturer of the lot. Made good quick growth, much similar to the Red Amber. Second growth came away very quickly. Representative plants made 10 to 12 stools 6ft. in height, with heads of loose panicles with flat grain. Averaged 2.03oz. grain per head.

Sunrise Kafir.—The best forage producer of the three Kafirs. Representative plants made 5ft. 6in. of growth, with 10-12 stools. Heads cylindrical, carrying small round grain; 2.42oz. grain per head.

Feterita.—Made a short thick growth, and headed well. Average plants were 3ft. 6in. high with 12-14 stools. Heads round, compact, and attractive. Grain large, round, and white, weighing 2 1oz per head.

Dwarf Yellow Milo.—Also made a short, thick growth; heads were mostly well filled, but they were short in the stem, and heads did not stand up well above the leaves. Average plants made 3ft. of growth, with 11 to 13 stools. Heads round and compact; grain large, round, yellow, weighing 2.58oz. per head.

Early Sumac Sorgo.—Made a comparatively tall growth, but did not stool so well. Average plants reached 5ft. 6in. high, with 8 to 10 stools. Heads were round and medium, grain small and shotty, weighing 1.98oz. per head.

Kansas Orange Sorgo.—Stood out as the most prolific forage producer, making quite a dense mass of tall, luxuriant growth. Average plants grew 6ft. 6in. high, with 13 to 15 stools carrying plenty of leaves. It was late in ripening grain, and many heads produced very little grain. Grain was medium sized, round, golden color, and well-matured heads averaged 2.75oz. grain per head.

Dwarf Hegari.—Made the poorest showing of all, only making 2ft. 6in. of growth; it stooled well, 10 to 12 per plant, but its heads were poor, and did not stand out above the leaves. Heads were medium sized, and grain large, round, white, weighing 1.6oz. grain per head.

Freed Sorgo.—This variety germinated so poorly that the whole plot had to be resown in December. Germination was then much improved, and though this late growth was light, plants reached to 5ft. in height, with 8 to 10 stools. Heads were light, loose panicles, with white, flat grain, weighing 0.96oz. per head.

MAIZE.

Block A.

The following table shows the yield of maize secured from the plots grown between the varieties of sorghum. As they were all one variety, the plots have been grouped.

Yields of Maize, Irrigation Block A, Kybybolite, 1922-23.

Variety.	Area. acres.	Total Yield. bush. lbs.	Yield Per Acre. bush. lbs.
Improved Yellow Dent—			
(Locally grown seed)	0.086	4 47	57 22
Improved Yellow Dent—			
(Victorian purchased seed) . .	1.020	51 14	50 14
Total for Block A	1.106	56 11	50 42
Farm average	8.066	376 8	46 32

The maize on this block germinated comparatively well, being poor in only a few small, heavy-clay patches. Fair average growth was made by the plants, and they produced a large number of cobs that were comparatively small, and not really well filled. Evidently the small blocks of maize, somewhat isolated between the blocks of sorghums, were the cause of the poor setting of the fruit. It is to be noted that this maize was planted with only 40in. between the rows, whereas all other blocks were sown with the rows 48in. apart. The plot of "Local seed" (saved from the previous season) showed a proportionately better growth during the season, about equivalent to the average acre yields received. The later waterings for berseem did not much affect the ripening of the maize.

Block B.

This section carried maize for grain during 1921 to 1922, and yielded 39bush. 40lbs. per acre without any dressing of farmyard manure. This year there was a fine growth of green weeds ploughed in early in October, and later in the month the soil was worked to a suitable tilth. On November 3rd maize was sown in furrows 48in apart. Several varieties were sown, and grains were planted at different spacings in the rows as a test to show the advantage or otherwise of close or open planting. After the seed was sown, the soil was harrowed, and 3cwts. mineral superphosphate per acre drilled over the block. A very fair germination resulted, and between December 2nd and December 6th the first irrigation was applied. This was followed by a dressing of 100lbs. sulphate of ammonia per acre, broadcasted between the rows, and cultivated into the soil. A second irrigation was given during January 13th and 15th, and the third, last, and heavy irrigation, during February 14th and 19th. The soil was cultivated between each watering. The maize made most of its growth during the warm months of February and March. A small percentage of "leaf wilt" appeared during the growth, but did not appear to affect the growth, or the setting of the grains, to any great extent. The maize cobbed comparatively well, and was ready for picking early in May. The following table shows the actual moisture received by this block:—

Moisture Received by Maize, Block B, 1922-23.

Date.	Rainfall. inches.	Irrigations. acre-inches.	Totals. acre-inches.
1922—			
November	0.32	—	0.32
December	2.81	3.82	6.63
1923—			
January	0.39	1.80	2.19
February	0.31	4.21	4.52
March	0.01	—	1
April	0	—	0
Totals	3.84	9.83	13.67

The following table shows the plots of maize, varieties with different spacings at seeding, with their subsequent yields:—

Yields of Maize, Irrigation Block B, Kybybolite, 1922-23.

Plot.	Variety.	Spacing in Rows 4ft. Apart.	Area. acres.	Total Yield. bush. lbs.	Yield Per Acre. bush. lbs.
1.	Boone County Special	Ordinary*	0.60	28 6	46 [illegible]
2.	Red Hogan (local seed)	„	0.08	4 30	57 [illegible]
3.	Red Hogan (Vic. seed)	„	0.52	19 31	37 [illegible]
4.	Early Leaming (Vic. seed)	„	0.24	10 29	44 [illegible]
5.	Early Leaming (local seed)	„	0.08	3 4	38 [illegible]
6.	„ „ (Vic. seed)	1 grain every foot	0.12	5 32	47 [illegible]
7.	„ „	4 grains in hills 48in. apart	0.12	4 0	33 [illegible]
8.	„ „	3 grains in hills 36in. apart	0.20	9 7	45 [illegible]
9.	„ „	2 grains in hills 24in. apart	0.20	7 7	35 [illegible]
10.	Early Yellow Dent	3 grains in hills 36in. apart	0.64	23 32	36 [illegible]
11.	„ „ „	1 grain every 12in.	0.64	24 15	37 [illegible]
	Totals		3.44	139 43	40 33
	Farm average		8.066	376 8	46 [illegible]

* Ordinary spacing is single grains 15in. to 18in. apart.

The following table shows the total variety yields for above area

Yields of Maize Varieties, Block B, 1922-23.

Variety.	Area. acres.	Total Yield. bush. lbs.	Yield Per Acre. bush. lbs.
Boone County Special	0.60	28 6	46 43
Early Leaming	0.96	39 29	41 11
Red Hogan	0.60	24 11	40 18
Early Yellow Dent	1.28	47 47	37 23
Totals	3.44	139 43	40 33

From the above tables it appears that comparatively close sowing of seeds and spacing of plants would give a slightly greater yield. Local seed, saved from the previous season, produced plants that showed no sign of "leaf wilt," and in two out of the three varieties tried, gave increased yields over the freshly-purchased seed.

BLOCK C.

This block of grass land was graded early in 1922, and dressed with about 60 tons farmyard manure per acre. A good quantity of green weed growth was ploughed under in October. On November 2nd, six varieties of maize were sown in furrows 4ft. apart, and 15in. to 18in. apart in the rows. Land was then harrowed, and drilled with 1 cwt. superphosphate per acre. Irrigations were applied very similarly to those given to Block B. The germination on this block was

not the best, but plants made good growth, and cobbed well. "Leaf wilt" also appeared on these plots, but not to any great detriment to the plants.

Moisture Received by Maize, Block C, 1922-23.

Date.	Rainfall. inches.	Irrigations. acre-inches.	Totals. acre-inches.
1922—			
November	0.32	—	0.32
December	2.81	3.15	5.96
1923—			
January	0.39	2.66	3.05
February	0.31	4.21	4.52
March	0.01	—	1
April	0	—	0
Totals	3.84	10.02	13.86

The above table shows the actual moisture applied to Block C, and the following one shows the yields of the varieties:—

Yields of Maize Varieties, Block C, 1922-23.

Variety.	Area. acres.	Total Yield. bush. lbs.	Yield Per Acre. bush. lbs.
Silvermine	0.60	37 39	62 48
Early Yellow Dent	0.56	29 38	53 7
Early Leaming	0.60	31 32	52 37
Boone County Special	0.60	28 44	48 7
Improved Yellow Dent	0.56	26 47	48 5
Red Hogan	0.60	25 4	41 40
Total	3.52	180 4	51 8
Farm average	3.066	376 8	46 32

Silvermine.—This variety made a very nice growth, reaching 9ft. to 10ft. in height. Cobbed really well, two to the stalk being very common. Cobs, however, were small, and tough on the stem. The grain ripened particularly well, and yielded 81.4 per cent. grain to cobs by weight.

Early Yellow Dent.—Did not germinate well, made good average growth, but did not cob so well as it did the previous season. Cobs were plentiful but small, and not evenly fertilised. Grain weighed heavy, and yielded 82.2 per cent. grain to cobs by weight.

Early Leaming.—Also suffered at germination, but plants made a very good average growth, and produced very fine, large cobs. Grain weighed well, and yielded 84.8 per cent. grain to cobs.

Boone County Special.—Poor Germination, but plants made good growth. This variety produced the largest and best cobs in appearance. Grain weighed light, and yielded 77.4 per cent. grain to cobs.

Improved Yellow Dent.—Did not make as good growth as in the previous season. Cobs were smaller, and not so evenly fertilised. Grain weighed well, but yielded 79.9 per cent. grain to cobs.

Red Hogan.—Made quite an attractive growth, and produced rather larger cobs than in 1922, but the yield was disappointing. Grain was light, and yielded 77.5 per cent. grain to cobs.

The following table shows the average yields received from the six varieties grown under trial during the past two seasons.

Average Yields of Maize Varieties Under Irrigation, Kybybolite, 1921-22, and 1922-23.

Variety.	1921-22. bush. lbs.	1922-23. bush. lbs.	1921-23. bush. lbs.
Boone County Special ..	60 40	47 25	54 7
Early Yellow Dent	63 46	42 11	53 3
Improved Yellow Dent	49 41	49 46	49 43
Silvermine	36 20	62 48	49 34
Leaming Early	—	45 33	45 33
Red Hogan	46 13	41 4	43 33
Means	51 44	46 32	49 13

N.B.—All maize has been calculated as weighing 50lbs. per bushel.

BERSEEM UNDER IRRIGATION.

A trial was made with berseem this winter by starting the crop in amongst the rows of summer crops. During March the spaces between the rows of maize and sorghum on Block A were cultivated to as level a tilth as possible, and berseem seed at the rate of 25lbs. per acre was broadcasted over the 2½ acres. The block was then immediately flooded. Seed was sown on March 27th, and by April 12th it had germinated splendidly. As April continued very dry, we were forced towards the end of that month to give a light irrigation—about 3 acre inches of water being applied. The weather broke on May 6th, and since then until end of July rain had been more or less continuous, and soil has been very wet all through the winter. The berseem grew comparatively well during May, especially where sorghums had been cut for green feed. Very little growth was made amongst the tall-growing varieties of sorghums that were left to ripen their grain. The maize plants did not so badly affect the clover, because they ripened off, and did not shelter the clover so much from the sun. During the latter half of June, we were able to cut the better patches of clover with the second growth of sorghums for the dairy herd, but the bulk of it was too short for the scythe, and during early July it was grazed off quickly by the milkers. It then gave good feed for 28 milch cows for eight days. Since then to mid-August the clover has made about 6in. of growth. We should secure good spring feed from it, but as a winter feed this trial has been a failure.

STINKING SMUT.

TESTS WITH VARIOUS CONTROL METHODS.

During 1923 the Department of Agriculture commenced a series of tests designed to determine the relative effectiveness of a number of different methods of treating seed wheat for the control of Stinking Smut (*Tilletia tritici*). The trials are being conducted on the Government Experimental Farm, Minnipa. The plots, five in number, are relatively extensive, each individual plot being approximately 25 acres in area.

During 1923 the plots, numbered 1 to 5, were sown with seed treated in the manner set out as under:—

Plot No. 1.—Sown with untreated seed.

Plot No. 2.—Sown with seed treated with Faulding's Dollman's Friend, at the rate of one packet of powder to 1½galls. of water, which was sufficient to pickle 6bush. of seed. This was pickled on a concrete floor and turned five times with a shovel, then spread out to dry and sown the following day.

Plot No. 3.—Sown with seed pickled in an old churn with dry copper carbonate at the rate of 3ozs. of powder to the bushel. It was possible to treat a bushel at a time in this manner. This seed was sown during the day on which it was treated.

Plot No. 4.—Sown with seed treated with a 1½ per cent. solution of copper sulphate, at the rate of 1gall. of solution to a bushel of seed. This was pickled on a concrete floor and turned five times with a shovel, then spread out to dry and sown the following day.

Plot No. 5.—Sown with seed treated with a ¼ per cent. solution of formalin at the rate of 1gall. of solution to the bushel of seed. This was pickled on a concrete floor and turned five times with a shovel, then sown the same day.

Field Inspection.

The crops were inspected directly after germination, during the last week in July, and when they had reached maturity. As a result of these inspections, the Manager of the farm, Mr. R. Hill, made the following observations:—

Plot No. 1 (untreated seed).—Came away well, there being a very good germination, and no check whatever in the growth. Stooling was very good right through the plot. There was evidence of smut right through it, but only a trace, and not as high a percentage as in the copper sulphate test. It was particularly noticeable in this plot that there were not the number of small heads commonly known as second growths that there were in the other plots.

Plot No. 2 (Faulding's Dollman's Friend).—This plot came away splendidly, and showed ahead of all the other plots for the first six weeks, but it then had a decided check in the growth. The crop appeared healthy enough, but did not move anything like as quickly from then on. The germination was only fair. The stooling was moderate. The heads were very well developed. There was a trace of smut through it, and the crop was a little later ripening than the remainder.

Plot No. 3 (copper carbonate).—This plot came away with the untreated plot, but the germination was not so good. The stooling was very fair, and the development of head good: but the crop shows as much smut as the untreated plot.

Plot No. 4 (copper sulphate).—This was the last plot to come away, although it had the advantage of being seeded several days before the untreated plot. The germination was fair, and the stooling quite good. There was more evidence of second growths in this plot than in any of the others. There was also considerably more smut in this plot than in any of the others.

Plot No. 5 (formalin).—This came away ahead of the copper sulphate treatment, which was the next plot to it. It showed a very fair germination, good stooling, and the development of the heads was very fair. This plot was more free from smut than any of the others. The only smut to be found in it was an odd head or so right through it.

COMMENTS.

In commenting on the one season's experience of these plots, Mr. Hill remarks that all the fungicides used evidently had a retarding effect on the germination of the grain. No one of them resulted in a crop absolutely free of smut. Formalin was the most successful, the crop grown from seed treated with this containing a mere trace of smut only. The use of Dollman's Friend apparently resulted in a lengthening of the period between germination and maturity.

In all plots on which smut was found, it was worse on patches of land where the soil was hard and the cultivation had not been so good. With the copper carbonate treatment there was no evidence of corrosion on the drill at the time the seed was put through it, but two months later, when the drill was being used for seeding other crops, parts of it had corroded.

ORCHARD NOTES FOR SOUTHERN DISTRICTS FOR MARCH, 1924.

[By C. H. BEAUMONT, Orchard Instructor.]

Much discussion has taken place on the results of spraying with arsenate of lead for control of codlin moth. There are but few growers who do not spray, but some still have a serious prejudice against putting poison on to fruit or food. Weak sprays are not good. Where less than 1lb. of powder is used to 30galls. of water there is certainly a greater percentage of codlin-affected fruit. Again, there is a difference in favor of those who spray several times before the end of the year, with one other spraying about end of January. More particularly I have noted that in the few instances where spreaders are used, much better results are obtained. Some very interesting results from a large Tasmanian orchard were recently published, and the claim made that 95 per cent. is not too much clean fruit to expect.

Fungous pests are prevalent this year. It is good practice to spray apricot, plum, and cherry trees which have been affected by shot-hole—Japanese plums especially need attention.

Pruning of apricot and peach trees may be commenced in the late parts; it is also useful to remove the bearing rods of vines.

Packing for export will be in full swing; study the new regulations, and pack well; give good, clean fruit, and keep up the name of the State. Better boxes are available this year. Fruit for storing should be carefully selected.

Make ready for replacements; take out sick trees, and open out the holes.

Where citrus fruits have not set, try cincturing by one clean cut to the wood, or by twisting wire to compress the bark, just after the blossoms fall. Keep the limbs well off the ground, it helps to ward off brown rot.

Order your trees if you are extending the orchard.

MOUNT GAMBIER AND DISTRICT HERD TESTING ASSOCIATION.

RESULTS OF BUTTERFAT TESTS FOR JANUARY, 1924.

Herd No	Average No. of Cows in Herd.	Average No. of Cows in Milk.	Milk.			Butterfat.		
			Per Herd during January.	Per Cow during January.	Per Cow August to January.	Per Herd during January.	Per Cow during January.	Per Cow August to January.
			Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
2/A	15	15	8,184	545·60	3,334·39	323·78	21·59	128·61
2/B	9	8·68	6,284	698·22	5,206·83	259·74	28·86	180·12
2/C	16·48	13	6,339·5	384·68	3,252·34	295·24	17·90	122·19
2/E	12·42	12	8,757·5	705·11	4,016·84	354·43	28·54	165·75
2/H	23·10	23·10	14,104·5	610·58	4,129·54	598·18	25·90	158·00
2/I	14	14	9,749·5	696·39	4,346·81	415·99	29·71	165·27
2/J	12·77	12·77	9,933	777·84	5,341·52	418·83	32·80	211·79
2/K	24	22·65	12,297·5	512·39	3,742·30	545·09	22·71	139·79
2/L	24	19·00	12,428	517 83	2,583·37	546·28	22·76	111·06
2/O	36	25·55	10,607·5	294·66	3,065·19	401·56	11·16	114·65
2/R	16	15·77	15,736·5	983·53	6,359·28	660·10	41·26	250·35
2/S	6	5·45	5,352·5	892·08	4,946 03	239·30	39·88	221·25
2/T	12	10·97	9,742·5	811·87	4,802·96	360·01	30·00	176·30
2/U	17	17	12,167·5	715·73	5,110·12	496·22	29·19	197·53
2/V	21	18·97	8,104	385·90	2,909·14	333·77	15·89	115·72
2/W	17	17	11,873	698·41	5,559·81	464·52	27·32	198·46
2/X	35	33·55	20,613	588·94	4,675·88	798·86	22·82	167·74
2/Y	12·06	10·61	8,216	682·92	4,837·42	330·41	27·47	188·82
2/Z	12	10·84	5,903	491·91	3,916·93	251·32	20 94	155·19
2/Aa	25	22·19	9,386	375·44	3,433·30	411·55	16·46	128·91
2/Bb	9	9	4,185	465·00	3,564·94	181·37	20·15	133·63
2/Cc	13	13	6,559	504·54	3,151·05	308·42	23·72	130·90
Means	17·36	15·95	9,841·95	567·06	4,013·05	408·86	23·56	153·99

GLENCOE HERD TESTING ASSOCIATION.

RESULTS OF BUTERFAT TESTS FOR JANUARY, 1924.

rd o.	Average No. of Cows in Herd.	Average No. of Cows in Milk.	Milk.			Butterfat.		
			Per Herd during January.	Per Cow during January.	Per Cow October to January.	Per Herd during January.	Per Cow during January.	Per Cow October to January.
			Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
	17	16	13,950	820·59	3,638·78	609·29	35·84	149·77
	16	15	4,929	308·06	1,623·55	240·10	15·01	69·22
	12	12	8,804	733·67	3,352·39	365·21	30·43	130·03
	12	11·52	8,949·5	745·79	2,214·04	375·67	31·31	84·20
	15	11·90	8,549	569·93	2,467·67	377·02	25·13	103·51
	9	9	6,231	692·33	2,910·30	282·43	31·38	113·04
	10	9·23	6,264·5	626·45	3,083·90	246·27	24·63	113·43
	15·26	15·26	9,204·5	609·08	2,512·71	413·08	27·07	92·79
	14	13	7,471	573·92	2,656·46	341·89	25·96	107·89
	14	14	7,378·5	527·03	1,821·86	331·06	23·65	79·16
	22·03	20·48	10,207	467·41	2,653·20	459·49	20·86	107·13
	19	17·42	9,567	503·53	2,435·42	457·49	24·08	94·19
	12	12	6,851	570·92	2,481·46	347·45	28·95	104·93
	20	19·55	12,227·5	611·37	2,402·96	502·45	25·12	96·81
	16·58	14·13	10,705	645·66	2,143·28	384·12	23·17	75·83
	12	10·10	5,779·5	481·62	—	246·88	20·57	—
	59·87	58·58	27,899·5	465·96	2,661·57	1,188·85	19·85	104·85
	17·84	17·84	11,568·5	648·46	3,028·75	480·42	26·93	127·51
ans	17·42	16·50	9,817·55	563·54	2,593·80	424·95	24·39	103·20

ADVISORY BOARD OF AGRICULTURE.

Minutes of meeting of the Advisory Board of Agriculture held at the Government Experimental Orchard, Blackwood, on Wednesday, February 13th, 1924. Present—Mr. W. S. Kelly (Chairman), Capt. S. A. White, Colonel J. Rowell, Professor A. J. Perkins, Messrs. J. W. Sandford, C. J. Tuckwell, L. T. Cowan, B.Sc. (Agric.), F. Coleman, H. Wicks, H. S. Taylor, and H. J. Finnis (Secretary).

Welcome to New Members.—The Chairman (Mr. W. S. Kelly) extended a welcome to Mr. H. S. Taylor who took his seat on the Board for the first time, and also to Mr. J. W. Sandford, who until recently represented the Royal Agricultural & Horticultural Society on the Advisory Board, but has now been appointed in a private capacity.

Destruction of Timber on Main Roads.—A resolution from the 1923 Annual Congress of the Agricultural Bureau to the effect that action be taken to prevent the destruction of timber on all roads in the State was brought under the notice of the local Government department, from whom the following report was received:—"It has always been the policy of the department to influence the councils to prevent the needless destruction of timber, and the inspectors individually have done their best to this end. We have given the question of providing for protection of trees on roadsides by legislation very careful consideration, but we do not think it practicable. It will always be necessary to destroy certain trees, for instance, when laying water and other mains, telegraph and electric power wires, when road improvements are being carried out, trees become dangerous, and various other reasons. To make provision in an Act for preventing the destruction of all trees excepting where necessary for the reasons mentioned would, in our opinion, lead to endless confusion and irritation. We think that, generally speaking, the councils have endeavoured to comply with the department's request to protect the timber, and that most of the complaints received have been due to the fact that those complaining did not understand why the timber was being destroyed." A general discussion took place in which Capt. S. A. White and Mr. F. Coleman referred to the need for some steps to control the destruction of timber on roadways. It was decided to endeavour to secure from South Africa and Victoria copies of Acts bearing on this matter and in operation in those States.

Rural Household Science Course.—The Secretary reported having informally discussed a proposal to establish a short course for women interested in agriculture and domestic science. It was decided that the Secretary should draw up a scheme for the consideration of the Board.

Cold Storage of Dried Fruits.—A proposal that dried fruit should be cold stored for the purpose of checking the development of moths therein was referred to the Horticultural Instructor for a report. The Board received from that Officer the following:—

"The inquiries I have been able to make from local merchants and officers in charge of cold stores verify the statements made by Mr. Tuckwell in his memorandum of the 5th instant. These all go to

show that cold stores are utilised to a limited degree locally for the above purpose, but time has not permitted me to search for data further afield.

"As far as I can ascertain, the cold storage of dried fruits has been adopted in Adelaide almost solely for the purpose of dealing with the dried fruit insect problem, but the samples I have seen indicate its value as a preservative of a wider character, viz., to maintain that color, texture, and early lustre usually found in new season's dried fruits. I propose, therefore, making a few remarks on the two phases of preservation—(1) Prevention of insect depredations. (2) Retention of fresh color and texture.

"In so far as the former is concerned, I can gather no evidence to support the contention that the insects are killed by the process, as has been the case with the larvae of the Mediterranean Fruit Fly (*Ceratitis capitata*) when they have been embedded in the pulp of fresh fruit submitted to cold storage for a given number of days. There is much reason for believing that a temperature suitable to the preservation of fresh fruits (33deg. to 34deg. Fahr.) has suspended the animation of eggs and larvae of the two common dried fruit moths—*Ephestia cahiratella* and *Plodia interpunctella*—and of the complete or incomplete stages of the two leading fruit-eating beetles (*Silvanus* and *Tribolium*). The only statement respecting the fatal influences attributable to the cold storage practice is given by the engineer of the Light Square Cold Store, and is stated to take effect on grubs seen on the surface when the fruit is brought out suddenly into a high temperature—the rapid change apparently preventing the functional processes of the animal from readjusting themselves, and death rapidly supervenes.

"In respect to this phase of suspended animation brought about by cold, entomological science has long been aware of, and practised the use of low temperatures adjacent to, but not as low as the freezing point of water, in transporting insects of a high economic value from one country to another, as witness the carrying of repeated consignments of ladybird beetles and other predators and parasites from Australia to America, Honolulu, Fiji, South Africa, and elsewhere, and the transmission of the fig fertilising wasp (*Blastophagus*) from California *via* London to Cape Colony, and holding it for several months dormant in cold storage until the local fig trees put out young fruits—before the eggs of the insects were awakened into activity inside the stored Capri figs.

"There is no evidence to indicate that the larvae or grubs embedded in the compressed masses of fruit would be killed when suddenly exposed, nor is there any to show that the long period of cold storage would destroy the embryo in the egg. There is, however, the possibility that the sudden removal of the fruit from the insulated cold room, might, through the condensation of much moisture thereon, prove detrimental to the maintenance of the good appearance of the product if it be held for a few weeks after removal to the grocer's establishment. There is, therefore, at present no guarantee that dried fruits on which eggs of fruit-infesting moths or beetles are deposited prior to the produce going into the cold store will not become infested

from within when brought out into a warmer and more suitable atmosphere.

"In so far as the rentention of the fresh appearance and texture of these products is concerned, I have no evidence which leads me to believe that the bloom and freshness which they retain in the cool atmosphere will be lost very rapidly providing they are warmed up to outdoor temperatures gradually with a view to avoiding undue condensation of the moisture from the outside air upon their skins. Such a wetting if permitted would, I am afraid, not only result in 'sugaring' at an increased rate from raisins and prunes, which had been dipped at the drying period, but in the case of the former hasten the darkening of the skins, and at the same time encourage the rapid growth of discoloring moulds on peaches and apricots, and possibly fermentation in prunes.

"This subject cannot wholly be separated from other methods of sterilisation and preservation now under experiment, particularly in the United States of America, and to a certain extent in our own country. I refer to the various methods of fumigation with CS_2 under ordinary atmospheric pressure, and CO_2 under vacuum, or sterilisation which incidentally is reached when dehydrators are substituted for sun drying. The methods of preservation after either of these has been employed consist in the use of insect and almost air-tight containers for holding the fruit. It is true all of these add to the cost of putting the fruit on the market, but the point to be worked out is, which will be the greater?

"Drying the fruit in the open air as at present, exposes it to insect infection, and storing it in ordinary stores afterwards increases manifold this liability to insect pests as well as to 'sugaring' discoloration, and loss of texture. To hold it in cold store to repress insects and retain the bloom of freshness until it is wanted for local consumption or export, and to ship it in cool chambers, perhaps to be held again overseas under similar conditions until sold to the distributors, must increase the cost considerably.

"Assuming that ordinary handling charges are the same as under present methods, the following figures may be of interest:—An ordinary 56lb. box measures over all 8in. x 13in. x 23¼in., or equivalent to 1¼ft. of shipping space. The freight to London on ordinary 56lb. box sent as general cargo, I am informed by the local secretary of the A.D.F.A. (Mr. T. S. Oldham), is 2s. 2¼d., calculated at 70s. per ton of 40ft., as against the statement on the authority of the Produce Department of 3s. 3d. per case if shipped in cold storage—a difference of 1s. 0¾d. If held here in cold store, the cost would be 3d. per case for one week (equals 10s. per ton), and 1¼d. per case (equals 4s. 2d. per ton) for each subsequent week, say, 22s. 6d. per ton for the first month, and 16s. 8d. per ton for each succeeding month. I have no figures to show what are the storage charges in the merchants' bulk stores.

"Notwithstanding any experiments in testing the other methods of sterilisation and preservation referred to herein, I consider a series of trials with the keeping in cold storage of a few cases of different kinds of fruits are worthy of attention. As apparently from the experience already gained, no special temperatures other than those used

in keeping fresh apples are required to hold dried fruit in good condition.

"I append to this report a letter received from Mr. F. Cole, of Messrs. Cole and Woodham, of Renmark, along with samples of Smyrna and South Australian sultanas, which former have, of course, been shipped to London and back—by ordinary stowage. The latter, Mr. Cole states, have been packed in their shed since last summer. A sample of dried apricots kept in a cold store since last year and procured by Mr. Tuckwell from the Producers' Cool Store at East End Market, Adelaide, is also forwarded. Although not made from fruits of the highest quality, the cleanness, color, and texture of these fruits would seem to speak well for the benefits of cold storage."

It was decided to recommend the Hon. Minister of Agriculture to institute a series of tests with the object of determining the commercial possibilities of storing dried fruit products in refrigerator chambers.

Conferences.—It was decided that Members should let the Secretary have a statement of the Conferences which they were prepared to attend during the coming 12 months.

Airless Storage of Fruit.—A communication was received from the Blackwood Branch seeking information relating to the Airless Storage of Fruit. It was decided to refer the request to the Horticultural Instructor for a report on the matter.

New Members.—The following additions were made to the list of existing branches:—McLaren Flat—J. Ingoldby, E. Connor, J. T. Powell, T. W. McMurtie; Coonalpyn—S. Angel; Tweedvale—H. N. Nuske, W. H. Fechner; Cygnet River—W. L. Ayliffe; Mount Pleasant—D. Stow-Smith; Lone Gum and Monash—A. Prater, L. H. Lehmann; Kongorong—J. Hay, H. Collins; Renmark—A. Badcock; Parilla Well—H. Petts; Light's Pass—J. Hahn; Tweedvale—F. B. Pulleine; Mannanarie—R. Bayness, H. J. Cundy, J. Clarke; Hartley—G. L. Harvey, W. C. Harvey; Two Wells—E. R. Wheller; Wynarka—A. J. Denton, A. Polkinghorne.

Inspection of Orchard—The Board having during the morning, under the guidance of the Horticultural Instructor (Mr. Geo. Quinn) and the Manager (Mr. R. Fowler), inspected the work being carried out on the Experimental Orchard, the Chairman took the opportunity of expressing his pleasure at the nature of the operations in progress. After several members had spoken, eulogising the orchard and its activities, it was decided on the motion of Mr. H. S. Taylor, seconded by Mr. H. Wicks, "that steps should be taken to bring under the notice of the Minister the Board's sense of the very high value of the work being accomplished at the State Orchard, Blackwood." Reference was also made to the need for compiling and publishing records of the activities of the orchard, and it was decided on the motion of Mr. H. S. Taylor, seconded by Capt. White, "that it be a recommendation to the Minister of Agriculture that such steps as may be necessary to bring about the compilation and publication of the results of the work carried out on the State Orchard, Blackwood, should be taken forthwith, and that if necessary a special grant should be made for the purpose, and an officer set aside to undertake the duties."

Peas.—The Chairman referred to the prospect of a considerable increase in the quantity of peas grown in this State in the very near future, and suggested the wisdom of taking early steps to ascertain the possibilities of an oversea market. He pointed out that the pea crop could now be harvested as simply as could the wheat crop, and there was every likelihood of its being grown extensively in the heavier rainfall wheat-growing areas as a crop in rotation with wheat. It was decided to request the Hon. Minister of Agriculture to secure from the Trade Commissioner samples of different types of peas marketed in London, together with a statement of the prices which each were bringing. It was also decided to ask that samples of South Australian grown peas should be forwarded to London for the purpose of having them valued, and that the Trade Commissioner might be asked to make inquires as to the extent of the market for South Australian grown peas in London.

Export Apples.—Members strongly protested against the proposal of the Federal Government to permit the shipment of 450,000 cases of "spotted" apples from Tasmania to London. It was urged that such an action would have a detrimental effect on the apple export trade of Australia, and it was decided to ask the Hon. Minister to transmit to the Federal Government an emphatic protest against this alteration of the regulations.

DAIRY AND FARM PRODUCE MARKETS.

A. W. Sandford & Co., Limited, reported on March 1st, 1924:—

BUTTER.—The phenomenally cool month just passed has upset all calculations with regard to supplies of butter in this State, and whereas in previous years long ere this it has been necessary to import top-grade butters from the other States to make up the shortage, so far this year there has been very little need for such a course, and at the moment the production in this State is still enough for local trade. Values are firmer than when last reported:—Choicest factory and creamery fresh butter, in bulk, 1s. 6½d.; first-grade bulk, 1s. 5½d.; second-grade bulk, 1s. 2½d.; third-grade bulk, 1s. 1½d.; best separators and dairies, 1s. 4½d. to 1s. 6d.; fair quality, 1s. 3d. to 1s. 4d.; store and collectors', in good condition, 1s. 1½d. to 1s. 3d.; stale and heated lots, 1s. to 1s. 0½d.

EGGS.—There were several fluctuations during the month, and owing to the rates in the eastern States advancing rapidly, values hardened here, but afterwards receded, the quotations at the end of the month being fresh hen, 1s. 2d.; duck, 1s. 3d. per dozen.

CHEESE.—The South-Eastern factories have been consigning regularly each week to our market, and rates ruling have been on a fairly even keel throughout the month, good trade being done. However, with London rates easier and lower quotations being made in other directions, the market has a weaker tendency, the range at present being from 10½d. to 1s. for large to loaf; semi-matured large to loaf, 1s. 1d. to 1s. 2d.; fully matured large, 1s. 2d. to 1s. 2½d.

HONEY.—It was expected with the advance in rates reported in our last that heavier quantities would be arriving, but apparently the take will only be limited, and the market is fairly bare of choice liquid qualities. Some apiarists are still holding some of last season's honey, but, apparently, are looking forward to higher money. Prime clear extracted, in liquid condition, realising 5d. per lb.; best quality candied lots, 4½d.; lower grades, 2½d. to 3d., according to quality. Beeswax, 1s. 3½d. to 1s. 4d.

ALMONDS.—There is very little business being done in these, the larger buyers waiting until the new crop commences to come along. Values at the moment are:—Brandis, 9d. to 9½d.; mixed softshells, 8d. to 8½d.; hardshells, 4½d.; kernels, 1s. 6d. to 1s. 6½d.

BACON.—Until the latter end of the month the values remained unaltered for this line, but owing to the higher prices of the live animal and carry-over stocks having about cleared, the market has firmed. Best factory cured sides, 1s. 3½d. to 1s. 4d.; middles, 1s. 6d. to 1s. 6½d.; rolls, 1s. 1½d. to 1s. 2d.; hams, 1s. 5d. to 1s. 6d.; Hutton's "Pineapple" brand hams, 1s. 9d. Lard.—Hutton's "Pineapple" brand lard, in packets, 1s.; in bulk, 11d. per lb.

LIVE POULTRY.—Supplies this month have kept up fairly well and, generally speaking, good values have ruled throughout. Especially does this apply to prime heavy-weight poultry, but there is also ready sale for the lighter sorts as well. Farmers, however, would do well to pen up and fatten birds before sending, for the enhanced values would more than repay them for the trouble taken. It is expected that owing to the festivities being arranged in Adelaide in connection with the visit of the British Overseas Fleet, strong demand will rule for poultry, so that satisfactory prices seem assured. Loan crate supplied on application. The following rates ruled at to-day's auction:—Prime roosters, 5s. to 7s. 6d. each; nice-conditioned cockerels, 3s. 6d. to 4s. 10d.; poor-condition cockerels, 2s. 6d. to 3s.; plump hens, 3s. to 4s. 3d.; medium hens, 2s. to 2s. 6d.; geese, 4s. 9d. to 6s. 9d.; ducks, good condition, 4s. 6d. to 6s. 4d.; do., fair condition, 3s. to 3s. 6d.; turkeys, good to prime condition, 1s. 3d. to 1s. 9d. per lb. live weight; do., fair condition, 11d. to 1s. 1½d. per lb.; do., fattening sorts, lower; pigeons, 8d. to 9d. each.

POTATOES.—Victorian and Mount Gambier potatoes have been realising from 9s. to 10s. per cwt. on rail, Mile End.

ONIONS.—Best-quality onions, at 10s. 6d. per cwt. on rail.

IMPORTS AND EXPORTS OF FRUITS, PLANTS, ETC., JANUARY, 1924.

IMPORTS.

Interstate.

Apples (bushels)	16
Apricots (bushels)	2
Bananas (bushels)	4,106
Lemons (bushels)	2
Oranges (bushels)	3
Passion fruit (bushels)	286
Pineapples (bushels)	164
Peanuts (packages)	1
Potatoes (bags)	4,195
Bulbs (packages)	40
Plants (packages)	21
Seeds (packages)	46
Casks, empty (number)	4,339

Rejected—22bush. bananas, 14bush. pineapples.
Fumigated—59 wine casks.

Overseas.

Federal Quarantine Act.

Seeds, &c. (packages)	3,552

EXPORTS.

Federal Commerce Act.

One hundred and thirty-three packages dried fruit, 94 packages fresh fruit, 1 package honey were exported to overseas markets. These were consigned as follows:—

London.

Plums	94

India and East.

Dried fruit	33

South Africa.

Dried fruit	100

Germany.

Honey	1

RAINFALL TABLE.

The following figures, from data supplied by the Commonwealth Meteorological Department, show the rainfall of the subjoined stations for the month of and to the end of February, 1924, also the average precipitation to the end of February, and the average annual rainfall.

Station.	For Feb., 1924.	To end Feb., 1924.	Av'ge To end Feb., 1924.	Av'ge. Annual Rainfall
Far North and Upper North.				
ginsdatta	0·04	0·74	1·39	4·94
arree.....	0·04	1·02	0·93	6·07
arina	—	0·81	1·09	6·66
apley	0·21	0·81	1·17	8·39
ptana	0·33	0·52	1·42	8·97
inman	0·70	0·92	1·77	12·53
arcoola	0·78	1·33	1·22	7·74
ookina	0·66	0·86	1·13	13·46
awker	0·56	0·91	1·21	12·92
lison.....	1·15	1·55	1·31	12·58
ardon	0·84	1·58	1·41	11·55
orn	1·03	1·59	1·34	14·21
rt Augusta	1·56	2·56	1·06	9·67
rt Augusta West	1·69	2·31	0·97	9·71
yce	1·00	1·68	1·15	10·77
ammond	1·10	2·01	1·32	11·91
illington	1·51	2·92	1·50	18·39
illowie	1·35	2·49	1·22	12·57
elrose	1·71	3·72	2·13	23·40
oleroo Centre...	1·44	2·65	1·42	15·65
rt Germein	0·93	2·34	1·16	12·89
irrabara.....	1·85	3·09	1·38	19·78
ppila	2·77	4·43	1·11	15·00
adock	0·70	1·10	1·28	11·52
rneton	0·93	1·74	1·40	12·90
hnburg	0·65	1·22	1·16	10·91
relia	0·83	1·63	1·47	13·54
rroroo	0·72	1·41	1·69	13·73
ckara	0·34	1·12	1·44	11·99
ack Rock	0·90	1·64	1·40	12·75
olta	0·65	1·35	1·49	12·04
terborough	0·83	1·87	1·48	13·53
ngala	1·13	2·31	1·37	14·58
Lower North-East.				
nta	0·43	0·91	1·36	8·88
ukaringa	1·15	1·61	1·12	8·54
nnahill	0·15	0·63	1·39	8·67
ckburn	0·59	1·39	1·31	8·31
oken Hill,N.S.W.	0·34	1·11	1·57	9·98
Lower North.				
rt Pirie	1·17	2·66	1·14	13·55
rt Broughton ..	1·20	2·51	1·15	14·29
rie	0·63	1·71	1·12	15·78
ura	4·03	5·30	1·37	18·26
lowie	2·22	2·93	1·37	17·20
meetown	1·63	3·28	1·29	17·89
ndaleer W. Wks.	3·03	4·20	1·28	18·09
ddstone	2·29	4·15	1·25	16·29
rystal Brook	2·50	4·52	1·26	15·95
orgetown	2·62	4·21	1·37	18·55
aridy	1·42	2·66	1·18	16·37
ehill	1·02	2·34	1·20	16·94
Lower North—*continued*.				
Spalding	2·12	3·49	1·33	20·27
Gulnare	3·00	4·25	1·35	19·36
Yacka	2·13	3·40	1·09	15·48
Koolunga	1·36	2·68	1·26	15·89
Snowtown.....	1·05	2·13	1·11	16·07
Brinkworth	1·25	2·54	1·09	16·30
Blyth.....	1·92	4·16	1·29	17·03
Clare	2·66	4·65	1·63	24·68
Mintaro	1·90	3·53	1·32	23·57
Watervale.....	2·55	4·27	1·65	27·54
Auburn	2·17	3·77	1·81	24·35
Hoyletou	2·00	2·88	1·29	17·91
Balaklava	1·60	2·47	1·27	15·95
Port Wakefield ...	2·32	3·00	1·21	13·28
Terowie	0·57	1·54	1·56	13·82
Yarcowie	0·68	1·61	1·44	14·22
Hallett	1·68	2·95	1·33	16·49
Mount Bryan	2·23	3·83	1·26	16·81
Kooringa	1·73	3·38	1·42	18·09
Farrell's Flat.....	1·89	3·59	1·37	19·60
West of Murray Range.				
Manoora	1·70	3·12	1·17	18·92
Saddleworth	1·60	3·14	1·45	19·78
Marrabel	1·70	3·09	1·30	19·78
Riverton	1·69	2·99	1·43	20·79
Tarlee	1·17	2·54	1·39	17·93
Stockport	1·29	2·33	1·34	16·63
Hamley Bridge ...	2·41	3·46	1·41	16·59
Kapunda	1·60	3·37	1·54	19·89
Freeling	1·27	2·34	1·36	17·99
Greenock	1·07	2·64	1·46	21·68
Truro.....	1·01	2·77	1·41	20·20
Stockwell	1·64	3·15	1·42	20·32
Nuriootpa	0·81	2·18	1·44	21·00
Angaston	1·18	2·69	1·49	22·53
Tanunda	1·40	2·87	1·50	22·24
Lyndoch	2·31	3·79	1·40	22·93
Williamstown.....	2·03	3·12	1·56	27·48
Adelaide Plains.				
Mallala	2·24	3·25	1·29	16·72
Roseworthy	1·23	2·44	1·29	17·35
Gawler	2·31	3·50	1·40	19·11
Two Wells	2·00	2·65	1·20	15·88
Virginia.....	1·60	2·07	1·28	17·32
Smithfield	2·10	2·78	1·19	17·24
Salisbury	1·64	2·31	1·35	18·51
North Adelaide ...	3·41	4·24	1·44	22·37
Adelaide	2·64	3·35	1·36	21·08
Glenelg	2·35	2·46	1·25	18·45
Brighton	2·28	2·70	1·44	21·37
Mitcham	2·21	3·09	1·47	24·26
Glen Osmond	1·82	2·68	1·60	25·94
Magill	2·94	4·02	1·60	25·35

RAINFALL—*continued.*

Station.	For Feb., 1924.	To end Feb., 1924.	Av'ge To end Feb., 1924.	Av'ge. Annual Rainfall
Mount Lofty Ranges.				
Teatree Gully	2·72	3·94	1·66	27·77
Stirling West	3·98	6·75	2·60	46·82
Uraidla	3·41	5·80	2·35	44·23
Clarendon	2·56	3·67	1·94	33·09
Morphett Vale	2·63	3·27	1·47	22·90
Noarlunga	3·31	3·65	1·27	20·41
Willunga	2·71	3·98	1·53	25·99
Aldinga	2·29	3·10	1·25	20·44
Myponga	3·86	4·88	1·90	29·80
Normanville	3·12	3·63	1·19	30·70
Yankalilla	3·30	3·73	1·30	23·31
Mount Pleasant	0·86	1·81	1·61	27·28
Birdwood	0·79	1·91	1·79	29·39
Gumeracha	1·79	3·27	1·87	33·36
Millbrook Reservoir	2·58	4·44	2·26	36·21
Tweedvale	2·08	3·31	1·83	35·65
Woodside	2·17	3·21	1·86	32·20
Ambleside	2·38	4·17	1·90	34·82
Nairne	1·76	3·14	1·85	28·44
Mount Barker	2·01	3·37	1·93	31·30
Echunga	1·79	3·43	1·89	33·06
Macclesfield	1·98	2·99	1·70	30·65
Meadows	3·48	5·19	1·92	36·19
Strathalbyn	1·71	2·74	1·40	19·36
Murray Flats and Valley.				
Meningie	1·98	2·69	1·42	18·74
Milang	1·46	2·03	1·21	15·45
Langhorne's Creek	1·78	2·08	1·02	14·77
Wellington	1·24	1·76	1·27	14·86
Tailem Bend	1·74	2·23	1·14	14·68
Murray Bridge	1·38	1·91	1·14	13·94
Callington	0·93	1·87	1·27	15·49
Mannum	0·97	1·43	0·97	11·66
Palmer	0·57	0·88	1·12	15·46
Sedan	0·57	1·52	1·07	12·27
Swan Reach	0·87	1·52	1·11	11·06
Blanchetown	0·52	1·43	1·07	10·09
Eudunda	0·67	2·08	1·32	17·51
Sutherlands	0·36	1·63	0·87	11·20
Morgan	0·75	1·81	0·97	9·30
Waikerie	1·74	2·71	1·31	9·87
Overland Corner	0·47	1·33	1·15	11·03
Loxton	1·01	2·16	1·71	12·50
Renmark	0·92	1·74	1·27	11·06
Monash	0·71	1·70	—	—
West of Spencer's Gulf.				
Eucla	0·54	0·62	1·19	10·01
White Well	1·00	1·07	0·94	9·20
Fowler's Bay	1·02	1·21	0·88	12·14
Penong	2·44	2·44	1·18	12·53
Ceduna	1·40	1·70	0·90	10·25
Smoky Bay	0·71	1·06	0·96	10·98
Petina	0·84	1·12	0·95	12·95
Streaky Bay	0·59	0·86	0·96	18·07

Station.	For Feb., 1924.	To end Feb., 1924.	Av'ge To end Feb., 1924.	Av'ge. Annual Rainfall
West of Spencer's Gulf—continued.				
Talia	0·50	0·84	0·73	14
Port Elliston	0·70	0·96	0·82	16
Cummins	0·73	0·79	0·94	16
Port Lincoln	0·95	1·26	1·07	18
Tumby	0·33	0·51	0·74	14
Carrow	0·27	0·53	1·13	14
Arno Bay	0·57	1·16	0·99	15
Cowell	1·71	1·21	1·01	15
Minnipa	0·86	1·94	1·88	15
Yorke Peninsula.				
Wallaroo	1·15	1·89	1·03	14
Kadina	0·82	1·80	0·98	16
Moonta	1·66	2·29	1·00	15
Green's Plains	1·21	1·92	0·96	15
Maitland	4·02	4·89	1·17	20
Ardrossan	1·96	2·28	0·94	14
Port Victoria	2·10	2·52	0·93	15
Curramulka	2·45	2·72	1·06	15
Minlaton	2·09	2·41	0·97	17
Brentwood	2·50	2·66	0·84	15
Stansbury	2·13	2·13	1·05	17
Warooka	2·06	2·21	0·96	17
Yorketown	1·65	1·92	0·92	17
Edithburgh	2·37	2·59	1·00	16
South and South-East.				
Cape Borda	1·60	2·08	1·15	25
Kingscote	0·97	1·31	0·99	19
Penneshaw	1·08	1·51	1·42	19
Victor Harbor	1·50	2·08	1·46	21
Port Elliot	1·47	2·20	1·38	20
Goolwa	1·08	1·52	1·34	17
Pinnaroo	1·08	1·79	1·33	15
Parilla	1·72	1·86	1·05	14
Lameroo	2·39	2·89	1·24	16
Parrakie	1·13	1·88	0·98	14
Geranium	1·59	2·33	0·99	16
Peake	1·74	2·42	1·39	16
Cooke's Plains	1·60	2·50	1·64	15
Coomandook	1·72	2·49	1·06	17
Coonalpyn	2·39	3·02	1·17	17
Tintinara	2·02	2·71	1·12	16
Keith	2·41	2·92	1·29	18
Bordertown	2·99	3·61	1·37	19
Wolseley	3·19	3·80	1·17	18
Frances	2·25	3·23	1·33	19
Naracoorte	2·75	3·56	1·46	22
Penola	2·74	3·88	1·80	26
Lucindale	3·08	4·01	1·37	23
Kingston	1·65	2·81	1·35	24
Robe	1·67	2·77	1·45	24
Beachport	1·54	2·22	1·72	27
Millicent	2·08	3·50	1·87	28
Kalangadoo	3·01	4·79	2·01	32
Mount Gambier	2·54	4·03	2·26	31

AGRICULTURAL BUREAU REPORTS.

INDEX TO CURRENT ISSUE AND DATES OF MEETINGS.

Branch.	Report on Page	Dates of Meetings. Mar.	April.
Alawoona	*	—	—
Aldinga	*	—	—
Allandale East	824	—	11
Amyton	*	24	—
Angaston	*	—	—
Appila-Yarrowie	*	—	—
Arthurton	*	—	—
Ashbourne	*	8	12
Balaklava	*	14	11
Balhannah	*	17	—
Barmera	791	17	14
Beetaloo Valley	*	15	19
Belalie North	*	19	23
Bet	796	—	—
Bethel	*	—	—
Big Swamp	808	21	—
Blackheath	*	18	15
Black Springs	*	17	—
Blackwood	*	—	—
Block E	*	1	5
Blyth	*	21	—
Booleroo Centre	*	—	—
Borrika	*	20	17
Brentwood	*	15	19
Brinkley	*	—	—
Bundaleer Springs	*	18	15
Bute	*	—	—
Butler	*	—	—
Calca	*	—	—
Cadell	*	—	—
Canowie Belt	*	19	16
Carrow	809, 817	18	15
Cherry Gardens	*	—	—
Clanfield	796	21	11
Clare	*	17	14
Clarendon	*	19	23
Claypan Bore	*	19	16
Cleve	*	—	—
Collie	*	28	25
Colton	*	19	16
Coomandook	*	21	—
Coonalpyn	*	—	—
Cradock	*	15	19
Crystal Brook	*	—	—
Cungena	*	21	—
Currency Creek	*	20	17
Cygnet River	*	—	—
Darke's Peak	*	—	—
Denial Bay	*	29	26
Edillilie	*	25	22
Elbow Hill	*	—	—
Eurelia	*	—	—
Farrell's Flat	824	29	26
Frances	*	24	—
Gawler River	*	15	19
Georgetown	*	29	26
Geranium	792	21	—
Gladstone	817	—	—
Glencoe	806	26	23
Glossop	*	19	23
Goode	*	18	—
Green Patch	*	24	—
Gumeracha	*	—	—
Halidon	812	19	16
Hartley	*	18	22
Hawker	*	—	—
Hilltown	‡	20	17
Hookina	*	—	—
Inman Valley	*	15	19
Ironbank	*	—	—
Kadina	818	8	12
Kalangadoo (Women's)	*	8	12
Kalangadoo	*	21	—
Kangarilla	*	15	19
Kanmantoo	*	—	—
Keith	*	—	—
Ki Ki	*	20	17
Kilkerran	*	—	—
Kimba	*	—	—
Kingston-on-Murray	820, 824	20	17
Kongorong	*	21	—
Koonibba	*	17	14
Koppio	*	—	—
Kringin	*	20	17
Kybybolite	‡	15	19
Lake Wangary	*	21	—
Lameroo	795	22	19
Laura	*	—	—
Lenswood and Forest Range	800	—	—
Light's Pass	*	—	—
Lipson	*	19	16
Lone Gum and Monash	798	—	—
Lone Pine	812	—	—
Longwood	*	—	—
Loxton	*	—	—
Lucindale	*	20	17
Lyndoch	*	—	—
McLachlan	817	—	—
McLaren Flat	*	18	15
MacGillivray	*	20	17
Maitland	*	17	—
Mallala	*	21	—
Maltee	*	—	—
Mangalo	794-5	20	17
Mannanarie	*	—	—
Marama	817	19	16
Meadows	*	—	—
Meningie	813	8	12
Milang	*	1	5
Millicent	801	15	19
Miltalie	*	3	7
Mindarie	*	21	—
Minlaton			

INDEX TO AGRICULTURAL BUREAU REPORTS—*continued.*

Branch.	Report on Page	Dates of Meetings. Mar.	April.
Minnipa	801	19	16
Monarto South	*	—	—
Moonta	*	21	—
Moorak	*	20	17
Moorlands	*	—	—
Moorook	*	24	—
Morchard	†	15	19
Morphett Vale	*	20	17
Mount Barker	*	19	16
Mount Bryan	*	—	—
Mount Byran East	*	—	—
Mount Compass	*	—	—
Mount Gambier	‡	8	12
Mount Hope	*	15	19
Mount Pleasant	817	—	—
Mount Remarkable	*	—	—
Mount Schank	*	18	22
Mundalla	*	19	16
Murray Bridge	*	—	—
Mypolonga	*	19	16
Myponga	*	—	—
Myrle	*	15	19
Nantawarra	*	20	17
Naracoorte	821	8	12
Narridy	*	22	19
Narrung	*	22	19
Neeta	*	—	—
Nelshaby	‡	15	19
Netherton	807	21	—
New Residence	807	—	—
North Booborowie	*	11	15
North Bundaleer	*	—	—
Northfield	*	—	—
Nunkeri and Yurgo	*	2	6
O'Loughlin	*	19	16
Orroroo	791	22	19
Owen	*	21	18
Parilla	*	21	—
Parilla Well	*	24	—
Parrakie	*	—	—
Paruna	*	—	—
Paskeville	*	21	—
Pata	*	—	—
Penola	822	1	5
Petina	*	22	26
Pinnaroo	*	15	19
Pompoota	*	12	9
Poochera	‡	1	5
Port Broughton	*	21	—
Port Elliot	*	19	16
Port Germein	*	22	26
Pygery	*	15	19
Ramco	*	17	—
Rapid Bay	814	1	5
Redhill	*	—	—
Rendelsham	822	19	16
Renmark	*	20	17
Riverton	*	—	—
Riverton (Women's)	*	—	—
Roberts and Verran	*	20	17
Rockwood	816	24	—
Rosedale	*	—	—
Rosy Pine	*	—	—
Saddleworth	*	—	—
Saddleworth (Women's)	*	11	15
Salisbury	*	4	1
Salt Creek	*	—	—
Sandalwood	*	—	—
Shoal Bay	816	18	15
Smoky Bay	*	15	19
Spalding	*	—	—
Stockport	800	21	16
Streaky Bay	*	—	—
Strathalbyn	*	18	15
Talia	*	10	14
Tantanoola	822-23	15	19
Taplan	*	18	15
Tarcowie	*	18	15
Tarlee	*	—	—
Tatiara	†	15	19
Tweedvale	817	20	24
Two Wells	‡	—	—
Uraidla & Summertown	*	3	7
Veitch	*	—	—
Virginia	*	—	—
Waikerie	*	—	—
Wall	*	—	—
Wanbi	*	—	—
Warcowie	*	—	—
Wetervale	*	—	—
Weavers	800	17	14
Wepowie	*	18	15
Whyte-Yarcowie	*	—	—
Wilkawatt	*	15	19
Williamstown (Women's)	800	5	2
Williamstown	800	21	18
Willowie	*	19	16
Wilmington	*	19	16
Windsor	*	—	—
Winkie	*	—	—
Wirrabara	795	—	—
Wirrega	824	—	—
Wirrilla	*	15	19
Wirrulla	*	—	—
Wolowa	*	—	—
Wookata	*	—	—
Wudinna	*	—	—
Wynarka	*	—	—
Yacka	*	18	15
Yadnarie	806	18	15
Yallunda Flat	*	—	—
Yaninee	*	—	—
Yeelanna	*	15	19
Yongala Vale	*	—	—
Yorketown	*	—	—
Younghusband	*	20	17

* No report received during the month of February. ‡ Held over until next month. † Formed.

THE AGRICULTURAL BUREAU OF SOUTH AUSTRALIA.

Every producer should be a member of the Agricultural Bureau. A postcard to the Department of Agriculture will bring information as to the name and address of the secretary of the nearest Branch

If the nearest Branch is too far from the reader's home, the opportunity occurs to form a new one. Write to the department for fuller particulars concerning the work of this institution.

REPORTS OF BUREAU MEETINGS.

UPPER-NORTH DISTRICT.

(PETERBOROUGH AND NORTHWARD.)

ORROROO (Average annual rainfall, 13.42in.).

February 23rd.—Present: eight members.

FLOODING v. SPRINKLING FOR IRRIGATION.—The Hon. Secretary (Mr. H. G. Matthews), who contributed a short paper dealing with this subject, said if the water were drawn from a supply of unlimited quantity, irrigating the land by the flooding system should be adopted. Where lucerne was grown the land could be flooded three days before the crop was cut, in order that the young roots of the plants would become established before they were exposed to the heat of the sun. When flooding was practised no outlay of money was required in the purchase of taps, hoses, &c. It might be argued that if the land were flooded weed seeds would be introduced on to the property, and that the land would form a hard crust and crack after the water was applied. Such might prove the case in the event of a heavy and sudden downpour of rain, but where one was able to flood the land at regular intervals, the difficulty would be overcome. Mr. Matthews said many arguments could be raised in favor of the use of the sprinkler. Sprinkling was to be preferred in places where the water supply was limited, because the water washed and cleansed the fodder, and a larger area of crop could be watered in a given time than could be handled by flooding, whilst for starting young plants there could be no doubt that the sprinkling was preferable to flooding.

MIDDLE-NORTH DISTRICT.

(PETERBOROUGH TO FARRELL'S FLAT.)

BEETALOO VALLEY (Average annual rainfall, 23.50in.).

February 18th.—Present: 11 members and three visitors.

MAKING THE MOST OF A SMALL HOLDING.—Under this title a short paper was read by Mr. J. B. Giddings, in the course of which it was stated that on a small holding it was advisable to have small paddocks fenced with strong netting and a barb on top, to keep sheep or pigs under control. Land which was suitable for growing fodder crops should be planted with lucerne. Each paddock should be provided with water, but if that were not possible a lane should be laid out so that the stock could obtain water whenever they desired. Shade should also be provided in each paddock for the animals. The stock on a small holding should include two cows for the household, and they should be milked and fed regularly. A few pigs were profitable, and could be fed with little expense on peas and waste from the garden. Horses were necessary to work the holding. A few fowls, if properly cared for, would also prove a profitable investment. A small garden, half an acre in extent, should be planted with mixed fruits and vegetables. The remaining arable land should be cropped, a rotation of wheat, oats, or barley, and field peas being practised. With such a rotation, cropping could be continued for a number of years without fallowing, which was a great consideration on a small holding. If the farmer did not have a pea harvester he could gather the peas with a horse rake, stack or thrash them, and feed them to sheep or pigs. When crushed, peas made splendid horse feed.

FARM BUILDINGS.—Mr. J. Pradd, who read a paper dealing with this subject, said all sheds and buildings erected on the farm were expected to give service for a considerable time, and they should, therefore, be built to the best possible advantage. Sheds and buildings that constantly required repairs were a hindrance to the efficient management of the farm, and gave an untidy appearance to the homestead. A warm, dry stable helped considerably to keep the horses in good condition, and saved a good deal of feed in cold and wet weather. Where possible, the stable should be built on the side of a hill, the back to the west, and the opening to the east. If material were available, the walls should be built with stone, and covered with an iron roof. Walls should be provided with ventilators to keep the stable cool in summer. It should be fitted with a manger, from which either hay or chaff could be fed, with plenty of room at the back for the convenience of those feeding and tending the horses. A strong post-and-rail yard, fitted with well-swung gates or slip rails, was preferable to the post and wire yards too often noticed on the farm. The chaffhouse should be built at the back of the stable, with a door opening on to the back of the manger. The barn could be built of stone and iron, on the side of a hill. A platform on the bottom side raised to the level of the back of the wagon, so that wheat and super could be trucked in or out, would obviate the heavy lifting and lumping that had to be done when the floor was not raised above the ground. Stone and iron could be used for the erection of the implement shed, the back and both ends of which should be enclosed, and the front opening to the east. Wide spans should be provided for the housing of large machinery and implements. The blacksmith's shop was also a necessity, and should be built large enough to meet all requirements. Fowl houses could be built with reinforced concrete or cement, using as little material as possible that would be likely to harbor vermin. Half-inch piping swung from the roof made excellent perches. Stone and iron buildings were expensive, but one should not lose sight of the fact that the first outlay was practically the only cost, because such sheds required very little upkeep. Straw sheds certainly served the purpose in many instances, but one had continually to be carting straw with which to renovate the roofs. When, however, they were erected, nothing but solid timber should be used. Shed forks should be placed into the ground to at least a depth of 3ft. 6in., and about 10ft. or 11ft. apart. Beams cut out of the tops of trees would prove stronger than those cut out of young timber. The middle row of forks should be longer than those on the outside, in order to give the water a good fall. The roof should project over the beams and forks to keep off the rain and give them a considerably longer life. The shed should be kept well covered with straw, otherwise it would leak, and the rain would quickly ruin the timber.

GLADSTONE (Average annual rainfall, 16in.).

February 15th.—Present: 13 members.

SHEEP AND WOOL.—In the course of a paper under the heading, "Australia's Greatest Production," Mr. W. Lines said every farmer could not be a breeder of stud sheep, but each flockmaster should aim at keeping a flock of sheep of high standard, and if he were not able to increase the number of sheep on his property he could assist in raising the quantity of wool per head if care in selecting the rams and culling the ewes were exercised. If that practice were carried out it would not be a difficult problem to raise the average yield of wool per head by 1lb., which would be of great value to both the producer and the country. Many farmers purchased a few sheep when feed was plentiful or when weeds were troublesome on the land, and sold the sheep again, being content to make a few shillings on each animal, but the man who kept a permanent flock would make between 25s. and 30s. with wool and lambs, if he obtained an average drop of 7? per cent. of lambs. It was necessary for the farmer who carried a flock of sheep to have some knowledge of the general terms which were used in the production of wool. Merino wool, when classed, was divided into two distinct types—combing wool and clothing wool. Combing wool was used for the manufacture of worsted goods, and should have a fair length of staple. Clothing wool was used far manufacturing woollen goods, and was generally distinguished by having a shorter staple than the combing wool, and usually it was of a finer quality. Wool with a tender fibre was classified as clothing wool, because it would not

stand the strain of combing. When classing wool, condition, which denoted the amount of yolk and grease that the wool contained, was one of the main points to be observed. A fleece that was heavy in grease would not give such a high yield, pound for pound, as a light bulky fleece. "Character" was usually applied to the wavy formation that could be noticed on the surface of the fibres of the wool. Character not only denoted the crimp of the fibre, but also embraced all the good qualities of high-class wool. "Lustre" was the glossy metallic brilliance usually confined to English breeds of sheep, whilst brightness was the soft shade of lustre found in the Merino. "Quality" was a term that was used very extensively in reference to both sheep and wool. "Quality" was generally used when speaking of fineness, but it should be used to indicate wool that was well developed and had character, soundness, elasticity, evenness of formation, and was freegrown. Classification of a Small Clip.—When a fleece had been thrown upon the wool table it should be skirted. All stained wool and sweaty edges should be removed. In the case of burry wool, if the fleece could be made free by taking off the shoulders and thighs, it was advisable to do so, but if the burrs were embedded too deeply into the fleece only the edges should be removed. When rolling a fleece, the side nearest the wool-roller should be turned in very lightly, and the other side brought right over; then it should be given another turn to bring the back into the centre. The neck should be folded back as far as the shoulder, and then the fleece rolled from the breech. That would bring the shoulder uppermost, thereby exposing the best part of the fleece. A small clip did not need heavy classing. Any fleeces that were tender in fibre, discolored, or heavy in condition, should be taken out and placed in a separate bale. A general fault when opening the wool on a sheep was to push the hands into the fleece and flatten the staples in all directions, thereby making it quite impossible to inspect the wool in a natural state. When opening the wool, one should be careful not to use pressure, but to spread the staples gently with the thumb and first and second fingers of both hands. The wool would then close again when released, without showing signs of handling. In the discussion that followed, Mr. J. H. Sargent asked the writer whether it was advisable to fill the bale well or only to fill it in lightly. Mr. Lines replied that it all depended on the number of bales. If there were only one bale he advised putting in as much wool as possible. Mr J. J. Gale said it was advisable to go through the flock before shearing. Many owners simply removed the dirty points of wool, but he believed in thoroughly skirting the fleece. Wool heavy in grease should never be placed with clean wool. In any clip there should always be two classes. Mr. R. E. Lines considered farmers should take more interest in wool growing, and that every man could, with little difficulty, keep a few sheep. Those who kept even a few sheep should make it a point to see that they also had a good ram. In his opinion, there was altogether too much dealing in sheep, which was very detrimental to the industry. The practice among many was to buy up sheep to eat down stubble, and then put them on the market. His experience was that wool growing at the present time was a more payable proposition than wheat growing.

MANNANARIE.

December 20th.—Present: 17 members and five visitors.

Mr. R. Bretag read a lengthy paper, "Merino Sheep and Wool Classing," and a keen discussion followed.

The Kitchen Garden.—At the November meeting a paper dealing with this subject was read by Mr. L. F. Gerke. The first work, he said, was to select a suitable site, preferably in the backwash from a flooded creek. A good dressing of well-rotted stable manure should be dug into the plot during July or August. For winter vegetables the soil should be prepared immediately after the first rains. Root crops were best sown in beds, and the plants should be thinned out to about 2in. apart in the rows. For parsnips and carrots the soil should be worked to a depth of at least 12in. The soil should be worked down very finely if small seeds were to be sown. After the seeds were sown, it was a good plan to give the plot a light dressing of stable manure to prevent the soil from forming a hard crust. Great care should be exercised in the selection of cabbage and other

vegetables that were to be transplanted, and only healthy seedlings should be set out into the permanent garden. Cabbages and plants of a similar character should be planted about 18in. apart. After they were planted the seedlings should be watered twice a day for the first few days, until they had become firmly established, after which one watering each day would suffice, but it was necessary to keep the hoe going so that the soil would not cake around the plants. Liquid manure could be made by soaking cow droppings in a cask of water, and about 1 pint of the liquid should be given to each plant three times a week. Herbs, such as thyme, mint, marjoram, &c., could be grown in boxes filled with soil composed of one part of earth to one part of rotted stable manure. Referring to summer vegetables, the speaker first mentioned melons, which, he said, should be planted in holes about 9in. deep and 15in. in diameter, filled with a mixture of old stable manure and earth. The surface of the hole should be somewhat below the natural surface of the soil, so that the water would remain around the plants. Several seeds could be planted in the one hole. Tomatoes could be treated in a similar manner, allowing one plant to each hole. When plants were being watered care should be taken not to allow the water to run too quickly, because it washed the earth away from the stems of the plants, and tended to make the soil crust on the surface. If the garden were properly cultivated, kept free from weeds, and received plenty of water, success in growing vegetables should not be difficult to attain. Another method of making a small garden was to enclose a small area with a stone wall about 3ft. high and 10ft. wide. This should be filled to within a foot of the top with prepared soil, and plants sown therein. The garden could be covered to protect the plants from frosts, which, although rather expensive, would ultimately be a saving, because the wall would protect the plants from hot winds and less water would be required.

WIRRABARA (Average annual rainfall, 18.91in.).
January 26th.—Present: 11 members and one visitor.

THE CIRCULAR SAW.—In the course of a short paper dealing with this subject, Mr. B. H. Borgas said before the saw was used the bench should be screwed up and the bearings firmly held in position, so that there would be no play in the spindle. Prior to starting to cut wood, the saw should be in good order and properly gulleted. If the saw were about 30in. in diameter, and the teeth from 1¼in. to 2in. apart, they should be kept gulleted to a depth of ¼in. to ⅜in., according to the distance between the teeth. The teeth should be gulleted a little to the back, so that if a line were drawn from the front of the tooth towards the centre, on a 30in. saw, it should show about 4in. to 6in. behind the centre, in order that the saw would draw in the wood instead of pushing it away. He preferred the hog tooth saw, because it cut the wood, whereas the peg tooth was inclined to tear the wood. The saw should be set about half as wide again as the width of the saw, and when it was being sharpened care should be taken not to remove too much from the heel of the tooth. When a saw was newly gulleted, it should be from 4-32in. to 6-32in. lower at the heel than at the point. The saw should be travelling about 9,000ft. per minute. When cutting firewood, the wood should be held against the saw at an angle, in order to prevent the timber from rolling into the saw.

LAURA, January 26th.—Mr. W. H. Campbell delivered an address, in which he dealt with his experiences during a recent visit to South Africa.

MANNANARIE, January 17th.—Mr. T. Chesson read a paper, "Handling and Care of Horses." Several questions on subjects of local interest were also brought before the meeting for discussion.

MANNANARIE, February 14th.—Mr. T. Chesson read a paper, "Handling and Care of Horses," and an interesting discussion ensued. In discussing the question, "The Best Method of Covering a Haystack," Mr. A. T. Symons favored roofing the stack with loose straw. The Hon. Secretary (Mr. W. Crawford) thought the best plan was to use sheaved straw as a thatch, and to fasten it securely in position.

LOWER-NORTH DISTRICT.

(ADELAIDE TO FARRELL'S FLAT.)

BETHEL.

January 22nd.—Present: 11 members and two visitors.

BREEDING AND CARE OF FARM HORSES.—In the course of a short paper dealing with this subject, Mr. B. Winter expressed the opinion that every farmer should endeavor to have at least one good brood mare, and then obtain the services of the best horse in the district. He considered that a good horse would always bring a good price and that it took no more fodder to feed a well bred animal than a mongrel. In the management of the farm team special care should be given to the selection of the harness. Collars that fitted the shoulders of the horses perfectly should be used, and the harness should be kept free from sweat and dirt. The speaker contended that if the horses were groomed every morning and the collars kept clean, the team would not be troubled with sore shoulders. A keen and interesting discussion followed.

CLARE.

January 18th.—Present: 14 members and visitors.

GRADING AND PACKING DRIED FRUITS ON THE MURRAY.—The Clare and Renmark Branches interchanged papers on the subject, "Packing and Marketing Fruits." The following is the paper by Mr. F. Cole, of Renmark Branch:—"The business of grading and packing dried fruits requires a good deal of experience and expert knowledge. Like most other callings in these days, one has to specialise to succeed. There has been a tendency in the past on the part of some people to imagine that any grower can start in the packing business, put up a 'makeshift' shed, and an old worn-out machine, and ask growers to entrust them with their fruit for preparation for the market. Under these conditions can one wonder that complaints have been made about bad grading and packing. The care with which classing, grading, and packing is carried out determines to a large extent the success or otherwise of the marketing of the product. Every packer should be very careful in his classification of fruits, and watch carefully that the standards are well maintained. I will deal first with classification. This is done at the shed door when weighing in the fruit. Currants have in the past been classed under three grades, which are determined before the fruit is put in the machine. For export three-crown currants are classed in three types, viz., three-crown small, being small fruit; three-crown superfine, being large bold fruit; and three-crown medium, being fruit of a three-crown grade that does not come under the heading of the other two types. The two-crown grade is also classed in three types, but the types are determined by the destination of the packed fruit. If intended for export, the same system as in the three-crown is followed, but if for Australian trade, these types are blended when going through the machine. The only sieve used in the past when grading currants is one with $\frac{3}{16}$in. holes, which takes out the buck fruit, which the elevator conveys to bags ready to go to the distilleries. These two are the main grades; the one-crown and manufacturers' grade are in the minority if good drying weather is experienced, but in years of disaster these latter grades may assume large proportions. In cleaning currants the machine should be carefully watched to see that the stems are being removed, also to see that sufficient blast is put on to blow out all light or red berries, which if left in will spoil the sample. I am not a believer in any patent attachment to grading machines, which saves all this inferior fruit and puts it back into the hopper to be again passed through the machine, until it escapes being blown out, and finally passes into the pack. This is against the principles of good grading, but it will give a low percentage of waste in the treatment of the fruit. The packer must decide one of the two things—Am I to sacrifice quality and purity of grade for a minimum of wastage? or am I to keep up the standard of grades, and not to make the main objective the reduction of percentage of waste? If you wish to be a successful packer and to get a good reputation for the product it will be necessary to study the quality of the fruit. The system followed by the writer when grading three-crown fruit is to place all the 'blow out' coming from the second machine with the two-crown grade to be blended with that class of fruit. This system usually works out

that out of a three-crown grade 5 per cent. is reduced to two-crown, and out of the two-crown grade 5 per cent. is reduced to one-crown. This method always keeps the grades pure and well up to standard. Sultanas graded for export are passed over a $\frac{3}{16}$in. sieve, separating the large from the small fruit, thus making two types of one grade, which are packed and branded Special and Choice respectively. The Commonwealth portion of the pack is a blended sample. The method followed in classing at the receiving door is to keep separate the types of the various grades, consisting of three distinct types, viz., the bottom, the middle, and top of the grade. These three types are blended in the hopper, thus producing an even sample of each grade. The grading of lexias consists in dividing the fruit into three sizes. The classing at the door is done in three grades—five, four, and three crown; each grade is put through the machine separately and run over sieves. In grading five-crown all fruit passing over a sieve with 17-32 holes is packed as five-crown; that passing over a 12-32 sieve is packed as two-crown. All falling through is run through the stemmer a second time, with a strong blast to blow out inferior berries, and is then packed as seedless. If the fruit is a bit on the damp side, this seedless grade will be rather dirty. It will be full of small stalks, which will necessitate running it through the grader a second time, but in any case it is advisable to run this grade through twice. The four-crown is treated the same, but the grade is four-crown from the top sieve, two-crown from the second sieve, and distillery passing through. In the three-crown grade only the large fruit passing over the 17-32 sieve is packed; all the balance is distillery. In my opinion there should be a distinction between the two-crown obtained from the five-crown and that obtained from the four-crown fruit, both fruits being the same size, but of different color. The fruit from the five-crown should be branded two-crown extra or two-crown choice. Pear grading presents difficulties. There is a difference of opinion as to which is the better—hand or machine grading. I favor hand grading, because the machine, using the present riddles with circular holes, cannot grade properly to size, the sample being very uneven in size and

color. The benefit of hand grading is in grading to color as well as size. There are usually three different colors—the canary color, the pink fleshy color, and fruit of a darker shade, although otherwise very good fruit. To mix these colors in one box would be fatal. Each color is packed separately, and branded with different marks, viz., three-crown special, three-crown choice, and three-crown fine. These brands define the different shade of color. This method of grading and packing is essential when exporting to Great Britain. The box must be faced by placing the fruit in the rows flat side uppermost. The easiest way to face boxes is to make the box upside down, paper and face on the bottom with the fruit, press and nail on the boards, which will then be the bottom. This method overcomes the trouble of weighing out the quantity of the facing fruit separate from the main filling, also avoids the necessity for pressing the box twice. The apricot and peach are packed in the same manner, but these fruits can be satisfactorily graded by the machine. Care must be taken when grading not to overload the machine. If the riddles became overloaded through feeding too rapidly, fruit will pass over, instead of dropping through the holes in the riddle. In purchasing a machine for grading purposes, always have a good margin in hand. For instance, if the business necessitates putting through 26 tons to 30 tons per day, install a 40-ton grader, because the secret in obtaining a good, clean sample of fruit is in giving the fruit plenty of room on the shaking table of the machine. With reference to the power to drive the machine, always have at least an extra five horsepower in reserve; it will be required when a bad drying season occurs, and the fruit comes in sticky. The machine requires more power in this case than in normal seasons, when the fruit is in good order. In conclusion, I cannot emphasise too much the importance of keeping up the standard of the grades, also in cleaning the fruit thoroughly before packing."

Homestead meetings were held during February at the residences of Messrs. R. E. Hunter and W. Patullo.

LONE PINE.

November 30th.—Present: 17 members and seven visitors.

HAY MAKING AND STACKING.—Mr. E. R. Hentschke, who contributed a paper dealing with this subject, said land on which it was intended to sow the hay crop should be ploughed to a depth of 3in. or 4in., and kept free from weeds by subsequent workings with the harrows and coltivator. Seeding should be commenced at the end of April or beginning of May, according to weather conditions. Mr. Hentschke favored a mixture of wheat and oats for hay that was intended for feeding purposes. When the crop was up, and had taken a good hold of the soil, it was advisable to work the roller, thereby strengthening the plants. Before the binder was put into the crop the farmer should see that the wheat and oats were showing a greenish-yellow color. The hay could be left for about one day on the ground, and then placed into stooks, each consisting of from 30 sheaves to 40 sheaves, with the heads pointing upwards. The best method of stacking hay that was required for immediate use was under an iron roof, but where the reserve supplies of fodder were kept in the open, a well-drained site should be selected, and the bed of the stack laid in a northerly and southerly direction, so that the sun could shine on both sides of the stack and evenly dry the hay. If straw were available, it could be used for the foundation of the stack. After the first layer of sheaves had been placed in position, the "ringers" should be bound with the heads towards the centre, thereby making the building of the stack considerably easier. It was also advisable to keep the centre sheaves somewhat higher than the edges, in order to allow for the stack settling down. Before building the roof, a ring layer of neat sheaves should be placed about 6in. over the edges of the stack to form the eaves, then an extra high layer of sheaves could be placed in the centre to form a steep slope to run the water off the stack. He considered it most necessary to cover the stack as soon as possible with a good thatching of straw, which could be kept in position by weighted wires or wire netting. A lengthy discussion followed.

On December 8th a visit was paid to Mr. A. J. Fromm's homestead, when a large number of members and visitors inspected the cereal experimental plots being conducted under Mr. Fromm's supervision.

WILLIAMSTOWN WOMEN'S.

December 5th.—Present: 15 members.

COOKING MEATS.—In the course of a paper dealing with this subject, Mrs. Cundy said for roasting beef the oven should first be heated, and a grid placed on the bottom of the dish to prevent the meat burning. Every quarter of an hour the meat should be basted quickly, and it should be turned once or twice during cooking. Half an hour should be allowed for each pound of beef that was to be cooked. If the meat were very fat it would require cooking for a longer period. The same procedure could be followed in cooking mutton and lamb. Pork and veal required more cooking, because the meat was close grained. For fowls, ducks, and geese a clear and steady heat was necessary. The average bird required from one and a half hours to two hours cooking, providing the seasoning was warmed before the bird was stuffed. Old birds should be steamed for about 45 minutes before they were roasted. It was most necessary that all poultry should be basted, otherwise the tender skins of the birds would burn. Rabbits should be treated in the same manner as poultry, and required from one and a half hours to two hours to cook. If the meat was to be boiled, it should be brought to the boil, and then gently simmered. Pickled pork to be cooked should be thoroughly washed and placed in plenty of water, with the skin side uppermost. A piece 6lbs. in weight would require about three hours' cooking.

LIGHT'S PASS, January 24th.—Eighteen members attended the January meeting, when a paper, "Fruit Drying," prepared by Messrs. A. Chapman and L. Robin, was read. A spirited and educative discussion followed. Messrs. Chapman and Robin, who are two of the youngest members of the Branch, ably replied to a number of questions.

STOCKPORT, January 25th.—The paper, "Farm Management and Efficiency," which had been presented at the Annual Congress was read and discussed. A further discussion took place on the subject, "Pea Growing and Harvesting." Several members reported having seen a pea harvester at work on Mr. W. S. Kelly's farm, at Giles Corner, and stated that the greatest difficulty in dealing with the pea crop, that of harvesting, had been overcome. Peas that were taken straight off the harvester were quite fit for market.

STOCKPORT, February 22nd.—Mr. S. Nairn gave an interesting address, in which he related some of his experiences during a 12-months' tour of the world. Twelve members and one visitor attended the meeting.

WILLIAMSTOWN, January 14th.—A combined meeting of the Men's and Women's Branches of the Williamstown Agricultural Bureau was held on January 14th. An address was delivered by Miss M. Hardy, a member of the staff of the County Farm Bureau, Vermont, U.S.A., and a paper, "The Export of Plums," was read by the Hon. Secretary (Mr. Geo. Brown).

On February 2nd a visit was paid to the Blackwood Experimental Orchard, and, under the guidance of the Manager (Mr. R. Fowler), the various pruning, spraying, and manurial experiments were inspected.

WILLIAMSTOWN, February 15th.—Thirteen members attended the February meeting, when a paper, "Spraying," was contributed by the President (Mr. W. G. Mitchell).

YORKE PENINSULA DISTRICT.

(TO BUTE.)

WEAVERS.

October 22nd.—Present: 11 members and visitors.

Mr. Dodd gave an interesting lecture, "First Aid on the Farm." A further meeting was held on January 21st, when the question, "Advantages and Disadvantages of the Co-operative Pooling of Yorke Peninsula Barley," was discussed

WESTERN DISTRICT.

MILTALIE (Average annual rainfall, 14.35in.).

February 16th.—Present: eight members and visitors.

SMUT IN WHEAT.—Mr. J. S. Jacobs read a paper dealing with this subject, and in the discussion that followed Mr. D. P. Bagnell said the eradication of smut was a difficult matter, but he believed that a solution made of equal proportions of bluestone and salt would assist in controlling the fungus. Mr. T. J. McEachen considered the harvester a great help in keeping a wheat crop free from smut, because the machine broke up the smut balls better than the stripper, and so gave the pickle a chance to do its work. He tabled a sample of wheat harvested with the harvester, free from smut balls, but showing the smut dust on the grain. Mr. H. R. Hogan preferred formalin for pickling seed wheat, and advised pickling the bags. Members were notified that the Hon. Secretary (Mr. W. G. Smith) had offered to give a prize valued at £1 for the most useful and instructive paper read at the Bureau during the year. A second prize, valued at 10s., was donated by Mr. H. R. Hogan.

MINNIPA.

FRUIT CULTURE ON EYRE PENINSULA.—Mr. A. G. Collyer-Braham read the following paper:—Horticulture has a full share in the ceaseless activity of the age, and therefore appreciable changes have been effected in horticultural practices. The writer considers South Australia has well been styled the "Garden State." It can be confidently asserted that no part of the world is more admirably suited to the production of the very wide range of fruits which are cultivated in temperate and sub-tropical zones than is this State. What would the horticulturists of Europe think of strawberries, cherries, apples, pears, walnuts, raspberries, plums, apricots, peaches, quinces, loquats, grapes, almonds, figs, oranges, lemons, mulberries, persimmons, guavas, and a host of other sub-tropical fruits all growing side by side in a 10-acre block without any artificial aids other than tillage and a little irrigation? And yet this is so in many a garden in South Australia. Fruit culture in South Australia has long since passed out of the probationary stage. From a spasmodic enterprise there has been evolved an established industry having a defined commercial basis. The business of fruit growing now contributes an important amount to the national revenue and the food supplies of the community, and employs many thousands of people. The men in it are up to date, recognising that only by the adoption of scientific methods and unceasing labor they win. The campaign against animal pests and fungi is never relaxed, while the researches of chemistry and entomology play a great part in spraying and manurial formulæ. As I have only had the trees in the farm orchard here under observation for two years, I must be excused if my conclusions in regard to some of them prove faulty 15 or 20 years hence. I must also beg to be excused for passing over each tree so lightly, as one could dwell for at least half an hour on each variety. Preparation of Land for Planting.—Before preparing land for a small orchard in these districts, try to choose a plot that has grown "boxbush" (*Alyxia buxifolia*), as this seems to be the best class of land. Failing "boxbush" country, choose something that has large timber on it. If soil will not grow good specimens of timber or shrubs—well, then, it cannot be expected to grow good specimens of fruit trees. Having selected the site, clear it thoroughly by grubbing and taking off as many roots as possible, thus lessening the danger of attack from termites (white ants). Having done this, plough it deeply—12in. if possible—as we cannot all use a subsoiler. Deep ploughing must be the order of the day for fruit trees, notwithstanding that expert opinion favors shallow ploughing in this country for cereal crops. Having ploughed deeply, constant cultivation must be carried out, so that the soil is exposed to the elements. This will quickly rid the soil of white ants. This cultivation should go on for a whole season, if possible. By this I mean that the prepared ground should not be planted until the following winter. Pegging out the positions for the trees must be done properly. You must measure your distances and sight the lines accurately, whether the distances to plant are to be 18ft. or 20ft. square or not. Choose your trees early; send down your order to the nurseryman in March. Impress on him the necessity

for delivering the trees at the end of May. Early planting in this country applies just as strongly to fruit trees and vines as it does to wheat and oats. Any trees you have to water in the spring will be so constitutionally weakened as to cause their exit before the summer is over, unless they can be watered throughout the summer. Therefore remember that once you commence watering them beyond the "watering in," when they are planted, your trees will succumb in this dry district. When preparing the holes for the plant, 2ft. x 2ft. and 1ft. deep is ample for this class of soil. Take the holes out 2ft. x 2ft. x 1ft. at least a week before planting, and burn some dead wood or roots in each hole. This will destroy any fungi or termites that happen to be in the vicinity, and thus give the tree a better chance as well as provide nourishment for it. As soon as the trees arrive, unpack and examine them. Any roots that are damaged or broken will have to be removed, and if you are not ready to plant them, "heel" them in the soil in a shady place, and water them down until wanted. When planting, the tree is usually put in the soil at the same level as it was when in the nursery. Spread the roots out evenly, and turn the ends of the large roots downwards, and then place the earth back on them, firmly treading the soil while filling. Give each tree about 1½galls. of water to settle the roots just after planting, and then leave it until a couple of weeks later, when it should be pruned out. Pruning.—We apply the art of pruning to fruit trees for three special reasons:—1. "To modify the form of the tree to meet the economical cultural requirements, and to counteract unfavorable climatic conditions." 2. "To reduce or stimulate the production of wood growth or fruit bearing, as the case demands." 3. "To remove injured or worn-out parts of the tree." No one can learn pruning by theory alone. One might read all the literature in the world on the subject, and still be unable to prune. To prune correctly you must observe facts. Each tree requires especial treatment. The treatment meted out to one peach tree can seldom be dealt out to the next peach tree in exactly the same way. Each tree differs in growth and constitution from its neighbor. The vigor of a plant is always dependent on the proportion of healthy leaf growth it possesses. Why so? Well, botanical research shows us that the leaves of a plant are like its lungs and stomach, as it is here that it breathes and effects alterations in its food substances, thus making it into plant building material. It follows therefore that the plant that has the most healthy leaf development when food is unlimited must be the stronger grower. In the development of a shoot, the more vertical or upright its position the stronger will it grow, because the natural law of vegetation is that the sap flows more abundantly to the highest point of each shoot. It also follows that as the shoot approaches the horizontal or recumbent, so its vigor will lessen. We know that vertical shoots usually run to wood, while horizontal ones turn to fruitage. If pruning is heavy, the stronger will be the growth arising from the buds retained. We prune severely in the first couple of seasons' growth of the young tree, so that the extra sap drawn into the plant will cause strong growth to arise from a limited number of shoots, forming thereby a sturdy regulated foundation for the tree to be built upon. If we prune heavily, we get fewer but stronger growths; if we prune lightly, we get many but weaker growths. When young trees are removed from the nursery beds quite a number of their roots are broken and bruised, thus causing them to be removed, as if left unpruned decay would set in. As the root system is in accordance with the vegetative system it therefore follows that as the root system is diminished so also must the vegetative system be reduced to produce a proper balance between root and stem. There are two seasons for pruning—winter and summer. Pruning in winter is most important, although summer pruning must be practised as well. Summer pruning only consists of thinning shoots and shortening laterals here and there, while the tree is in vegetative activity. A practical demonstration of pruning on various trees should be witnessed before attempting to do it by oneself. I must add a few words of warning here. If you aim to have an acre or two of orchard do it properly or leave it alone. Do not plant trees with the idea of having something easier to look after than cereal land, because you will be mistaken. You must cultivate and cultivate and cultivate again and again. No weed must be allowed to have room when the trees are needing the scanty moisture available. You must often spray with this and that solution if your efforts to suppress pests are to be

successful. The reply of the Oxford University gardener to a man who asked him how such a beautiful lawn was made was this:—"You cuts it and rolls it for 200 years, and then when you're done that you brings out the roller and rolls it again." And something similar will apply to your cultivations and sprayings to make a profitable orchard. A summary of fruit trees as they present themselves at the Experimental Farm Orchard. Loquats.—The loquat being worked on a quince stock will, I am sure, do well here after they have grown sufficiently large to shelter their own fruits. There is little or no pruning except rubbing off crowding centre shoots the first few years. Figs.—Figs, as presented in some of the sorts at the Farm Orchard are very disappointing. Where the rainfall average is 15in. or 16in. I think certain varieties will do well, but when the annual fall drops to 9in. and none at all during the growing period they present a very sorry spectacle towards the end of February. The pruning is very light, with an occasional shortening back of the laterals and thinning a branch here and there is all that is required. Pears.—Pears of well-chosen early varieties will do well in this climate. They seem very susceptible to root canker or gall, and if this is not removed the white ants quickly find a home there. The pear is rather a slow grower here, but it is usually a long liver, and, given fair conditions, should do well. Pruning consists of allowing four leaders to carry on the framework of the tree and shortening these back for several seasons. The lateral growth is shortened very little until fruit spurs set. Quinces.—Quinces promise to do well in this climate and class of soil. About four main arms are ample for the foundation of the tree; secondary arms can then come off from these in proportion to the growth of the tree. Shorten the leaders back hard for the first few years and then only moderate pruning is required. The fruit is borne on the spindly lateral growth of the current season, which should be just pruned at the tip, as it invariably dies back a few inches if left unpruned. Wherever a fruit

has been borne the stem will thicken up, and so cause extended lateral growth the following season. Such varieties as "apple," "pineapple," "Smyrna," and "Champion" all do well in the orchard. Apples.—We look upon the apple as a moist-loving tree, and very little faith is pinned to growing this class of fruit here, and yet there are some three varieties that have done exceptionally well in the Farm Orchard, and I think it would be profitable to plant a couple in the farmer's fruit garden. Four main arms, in my opinion, would form a good foundation to work on. Shortening back leaders and any laterals over 15in. long is all the pruning necessary for the first couple of years. Varieties to choose from:—Cleopatra, Jonathan, and Dunn's Seedling. Apricots.—The apricot has done better than any other fruit in the Farm Orchard, and I think it a safe proposition to plant apricots freely. Even during a very dry year they will come out safely each time, because the fruit is harvested early in the summer, and they need very little moisture to carry them through. The pruning is not very hard to master, although a little tedious at times through cutting out the spent fruit spurs. The fruit is borne on the current year's growth, so that constantly cutting out spurs to encourage new growth must be performed. There are some varieties, such as Royal, which need special pruning, that is, the laterals must be left long to encourage such laterals to send out numerous fruit spurs. These laterals must not, however, be allowed to get too far away from the source of sap supply—the secondary arms, &c. Varieties:—Oulin's Early, Moorpark, Tilton, and Royal. The last-named two varieties are best for jam, and the first-named two for dessert. Moorpark and Tilton are best for preserving, while Moorpark is the best variety for drying. Plums.—Plums generally present rather an unpromising appearance at the Farm Orchard, but I think most of the damage has been caused during their early stages of growth. They have been allowed to grow a very tall stem, which suffers from sun-scald. I do not recommend extensive planting of plums, as they not only like a moist climate, but they are also subject to attacks by "borers," termites, and "root gall." They may do better under special and proper treatment from the first. The trees in the orchard lacked attention for the first two and a half years, so that special treatment in the early stages of growth would probably have made all the difference. At least the high "stock" could have been avoided, and thus sun-scald prevented. Nectarines and Peaches.—The nectarine is claimed to be only a smooth-skinned peach, and the pruning and other work is the same for both. Both have done remarkably well in the orchard, but both have taken "root gall" and white ants to an alarming extent. The growth of these trees is rank, which proves that the soil and climate agree with their constitution, and even where the attacks of ants and "root gall" are worst the trees make a bold bid to thrive. Two varieties of nectarines did famously, and two of the early peaches. Late peaches have done nothing at all, and it is a waste of time to try to grow the late canning varieties. The life of these trees may be anything from 10 years to 15 years, even if they contract canker, and if anyone is prepared to plant every 10-15 years then I would say plant some of the early varieties, as they will amply repay, even if they die out in 15 years. The pruning is very simple, and when you have seen it done once or twice you will only require practice to master it. The pruner must always remember that the fruit is borne on the current season's growth, and that when once a spur has fruited it must be cut out to encourage new growth from the secondary arms. I will show you on the board the perfect style of tree, so you may get as near to it as your own particular specimen will allow. Varieties of nectarines:—New Boy and Goldmine. Peaches:—Triumph, Hale's Early, Red May, Wiggins, and Elberta. Citrus.—All the citrus family do better here than almost any other fruit if only irrigation could be practised. But then this is impossible on a large scale in this parched-up country, where water is nearly as precious as gold during their growing season, which is spring and summer. I recommend planting a couple of trees near the house, where a little of the waste water from the home could be given them. There is little or no pruning to do except rubbing out central shoots, thinning now and again, and cutting out dead twigs. Stone and pip fruit have to be pruned like an inverted cone, while the citrus family are kept dome shaped, that is, hollow in the centre but meeting at the top. The chief points to bear in mind are that the lemon bears its fruit on the inside of the tree on short stubby growths, while the orange

bears its fruit on the outside of the tree, just within the shade of the further growth from the centre. Varieties:—Lemons—Lisbon and Eureka. Oranges—Navels—Washington Navel and Golden Nugget; seeded oranges—Joppa, Valencia (late), and Poorman; mandarins—Daney's Tangerine and Nobilis. Almonds.—Almonds will do well in this country provided the white ants can be kept off. They have not taken canker like their cousins, but the ants seem to attack these as well as the softer wooded trees. The pruning is easy and very light, although some of the drooping kinds have to be pruned to an inside bud to make them more upright in their growth. Varieties:—Hatcher's Nonpareil, IXL, White Nonpareil, and Peerless. Leave Brandis out, as it is a very shy bearer. Vines.—Any of the vines will do exceptionally well on this class of soil and in this climate. The one great enemy of the vine is the white ant. If the ants can be kept off for the first two or three years after planting, then you will get a wonderful return. The best way to grow a number of vines is on the "Thomery System." To make the trellis, place the lower wire 2ft. 3in. from the ground, 15in. above it place the second wire. It is quite low, and so misses a good deal of the high winds that prevail in these parts. Trained on twin arms, 12ft. between the plants; half a chain between the posts seems satisfactory distances. There are 14 different prunings for vines. Most of them do well on the spur-pruned principle, but sultanas must be rod and spur pruned. Therefore three wires are needed for this variety, so that one can tie the rods down to a bottom one. The currant can be spur pruned, but it must be cincturned; that is, a piece of bark must be removed just as the corollas are falling, so as to check the sap, and thus cause a setting of the fruit. The Olive.—I have included the olive here because I think it is going to do better than anything else we have transplanted. It is known to be a drought resister, a long liver, and a profitable proposition. Trees are easily raised from truncheons in 12 months. The only disadvantage is that they take a few years longer to come into full bearing, but still the length of life will easily compensate for that. Verdale variety carried its first fruits last year, and I estimate that in six years from planting a fair return could be obtained from this variety. We have several varieties, but there seems to be only two that have done exceptionally well—Verdale and Gros Rodineau, although Bouquettier has grown well, but no flowers have shown yet. We have nothing much to cause cross fertilisation except a few insects and these winds, but I am afraid the wind does more harm than good. Therefore a few colonies of bees about the locality would improve matters considerably.

YADNARIE, February 19th.—The first meeting for the new year took the form of a social evening, which was attended by 25 members and a large number of visitors. Several papers were also read and discussed.

EASTERN DISTRICT.

GLOSSOP.

January 23rd.—Present: 27 members.

POINTS FOR THE BLOCKER.—In the course of an address dealing with this subject, Mr. Olorenshaw emphasised the point that in preparing land for planting and watering, the buck scraper should be used as little as possible. The subsoil was nearly always unsuitable for immediate use, and, as a rule, vines that were planted too early in the life of the block usually died. He favored waterings not more than six chains in length, because longer waterings resulted in an uneven distribution. Cuttings should be selected from healthy fruit-bearing canes, which would make good growth, so that the stem could be taken to the wire during the first year. Care should be taken to obtain perfectly upright stems, and to train the arms in the form of a perfect T. Ploughing should be done early, and if vines were planted at the end of February they could be turned under at the end of May. The land should be left in a rough condition until the first irrigation, and immediately after the application of the water it should be disced, working the plough towards the centre of the cultivated area. The cultivator should always follow the work of the disc, so that a rotation of ploughing towards the centre, discing out, and cultivating, would result in level lands at the end of the

season. A heavy furrow should always be thrown back to cover the roots of the vines. "Busters" the speaker considered to be preferable to ploughs for throwing out, because the furrow of the former did not scour so badly as that of the latter. An interesting discussion followed.

NEW RESIDENCE.
February 20th.

SEED WHEAT.—Mr. P. J. Voigt, who read a paper under the heading, "The Best Method of Obtaining Clean Seed Wheat," said it was a very difficult matter for the farmer to keep his seed wheat clean and true to type. The majority of farmers in that district had to resort to the practice of putting the seed wheat throught the winnower or a grader in order to remove barley and other foreign grains, and even then it was only fit for one year's sowing. As a remedy he suggested that the members of the Bureau should co-operate and purchase a truckload of clean, pure seed, which could be given to a farmer who had clean fallow on which to sow the grain. If that plan were adopted the whole of the farmers in the district would, in the course of a few years, be able to obtain, without any difficulty, supplies of good seed. For that district he favored Early and Late Gluyas. Mr. H. Klau, in commenting on the paper, agreed that Late Gluyas was a good yielding variety, but it produced a light weighing and shrivelled grain. Mr. W. Schier stated that Gluyas made too heavy a growth of straw. Mr. T. Tschirpig preferred Silver Bart. Mr. W. Tham favored Walker's Wonder. It was decided that the Secretary should write to the Manager of the Veitch Experimental Farm for quotations of varieties of wheat suitable for the New Residence district.

NETHERTON, February 15th.—Several items of local interest were brought forward for discussion. Consideration was also given to the inauguration of crop competitions and the holding of a tractor trial under local conditions.

SOUTH AND HILLS DISTRICT.

BLACKHEATH.

January 25th.—Present: 10 members and visitors.

LUCERNE CULTIVATION.—The following paper was read by Mr. H. G. Pym.—"Lucerne requires for its successful cultivation certain definite conditions. It will thrive in a variety of soils, under extremes of heat and cold, and under a greater range of annual rainfall than many other crops, but it requires a good depth of soil. It will not stand wet feet. It has an extraordinary partiality for lime, and if grown on soils lacking in nitrogen this deficiency is readily supplied by the presence in the soil of bacteria which utilise nitrogen from the air, and so transform it into plant food. Lucerne is a long-lived plant. Frequently after a stand of six or seven years, the plants, whilst still vigorous, become woody, and then it is advisable to plough the crop under and take off crops of maize and wheat before sowing again with lucerne. There are many varieties of this crop, but perhaps the most popular are the Hunter River and Tamworth. Best results are obtained from local seed. Lucerne, of course, will not grow if the rainfall is insufficient, and if this cannot be supplemented by irrigation, heavy or even good yields are out of the question. But before deciding that the district is too dry, we should answer the question, 'What fodder plant will do better?' The heaviest yields are obtained on the best alluvial soils found on river banks—deep, free soils, well supplied with lime and potash, and with free water 15ft. to 30ft. below the surface. The land should be well drained, otherwise the lucerne will die. In preparing land for sowing, one should endeavor to keep the growth of weeds down to a minimum. Young lucerne plants grow comparatively slowly, and are apt to be killed by weeds during their earlier stages of growth. This is particularly the case where the seeds are sown in autumn. It is the practice of some growers to sow 2bush. of field peas per acre, and then plough this crop under before sowing the lucerne, as a means of keeping weeds under control. Do not leave the ploughing under too late in the season, because if this work is done in warm weather, fermentation, which is harmful to the lucerne seed, may commence. Just before the seed is sown, the land should be lightly ploughed and then harrowed and rolled. A firm seed bed is necessary, and to obtain this it may be found necessary to roll twice. Lucerne will not succeed on sour soils, or those which have a strongly acid reaction. It prefers a soil which is neutral or slightly alkaline. Acidity occurs in worn-out soils which have been cropped for many years in succession, or in sour or badly drained land. The free growth of sorrel is an almost certain indication of soil acidity. In sowing lucerne, do not use a nurse crop. In light soil which is apt to drift, it may be advisable to sow a very thin seeding of a cereal in order to protect the young plants from the drifting sand. On dry uplands and for the dry culture of lucerne, thin sowing is the rule—from 4lbs. to 6lbs.; but in rich flat lands from 10lbs. to 15lbs. per acre are used. Lucerne that has been planted for two years will stand an extraordinary amount of cultivation, and benefit thereby. I have tried this on my plot with a springtooth cultivator with narrow shares, and worked it two ways, and one would almost think that the crop had been destroyed, but this year it was thicker and heavier than during any previous season. Lucerne should be cut when about 10 per cent. of the plants are in bloom. If cutting is done on a hot day the lucerne should be raked the same day and put into cocks, and carted before it becomes too dry, in order to secure all the leaves. The valuable part of lucerne is the leaf, and in all haymaking operations care must be taken to see that this portion of the plant is conserved." Mr. J. Pym tabled four cuts of lucerne, showing the length of each different cut. Each cut showed prolific growth, measuring over 12ft. in all. The lucerne was grown on his property without irrigation.

BLACKHEATH.

February 14th.—Present: eight members and visitors.

FENCING.—The following paper was read by Mr. R. S. Talbot:—"One of the most important items of the equipment of a farm is good serviceable fencing. The work of fencing will be considerably lightened if it is done when the ground is soft, so that the holes can be easily sunk. When erecting fences in hilly and

rough country there are many obstacles to overcome. In rough country the posts can be put, say, half a chain apart, or even more, with three droppers, or one iron standard and two droppers between the posts. For a heavier fence the posts can be spaced 8yds. apart, with one large dropper between the posts. Posts should be cut to suit the nature of the ground—for rough country, say, 5ft. 2in., and for sandy soil 5ft. 6in. But wherever possible I prefer large posts. Leave the post out of the ground from 3ft. 6in. to 3ft. 8in., using five or six wires, which ever is needed, and bore the holes with a ⅝in. bit. Struts for strainers should, in my opinion, be placed between the top and next wire, and at an angle where two are necessary. One should be about 6in. lower on the post than the other, and about half the length. Both struts at the angle should be kept on the same side of the fence, to ensure greater strength to the strainer post. Barb wire can be used to enclose horses and cattle, in order to protect the fence, but where only sheep are kept the barb is not needed. The bottom wire should be 7in. or 8in. off the ground. Wooden droppers can be cut from a tree that will split well. saw off the logs at the exact length, split and trim them; the chips, &c., make excellent wood for burning. If the farmer has a drilling machine, the task of boring becomes much easier; one man can hold the dropper and one turn the handle. There is no stopping from one hole to the other, and no back turning to pull out the bits. Strainers need not be bored if a patent wire strainer is used. The wire can be strained from any position."

CHERRY GARDENS (Average annual rainfall, 35.03in.).

January 22nd.—Present: 12 members and visitors.

ORCHARD MANAGEMENT.—Mr. M. G. D. Basey, who read a paper under this title, said he proposed to deal with the subject from that stage at which the fruit season had been completed and the winter months were approaching. The work of the orchard could be divided into four separate sections—pruning, cultivation, spraying, and harvesting. After the trees had lost their leaves, and were dormant, pruning was the first work that required attention. He was a firm believer in close spur pruning for the Jonathan, Dunn's Seedling, Rokewood, and Yates varieties of apples. The trees of these varieties were so constituted that unless the wood was kept back short, the fruit would appear on the long unstable laterals, and heavy winds would play havoc with the trees. His experience of pruning the Jonathan was that all of the growth of the present year should be cut back to about three buds, including the base buds. By that means the tree would throw fruit spurs from those buds instead of remaining practically dormant, as would be the case if the laterals were not pruned. He was also in favor of heading back the leaders on the varieties of apples previously mentioned, thereby assisting in throwing back the sap to the fruiting wood and increasing the vitality of the tree. Apples that were subject to bitter pit should not be spur pruned. His practice was to leave such trees until they carried a very heavy growth of wood, and then take out a limb with the saw. The pear required very careful handling for the first year or two, but once firmly established with plenty of fruiting wood it would adjust itself, and require very little treatment with pruning tools. Water shoots and weak laterals should, of course, be thinned out. The very important work of cultivation followed closely on the removal and burning of the pruniugs from the orchard. Ploughing should, if possible, be completed by the end of September, the land being ploughed two ways to a depth of 5in. or 6in., and then worked with the harrows to form a level soil surface. The remainder of the land around the trees should be worked with the hoe or fork. Then, as soon as possible, a tyne cultivator should be run over the land. If that practice were continued up to the time of harvesting, a moist subsoil with a loose surface soil would be the result. Referring to the manuring of the orchard, the speaker said he had selected several (30) Jonathan apple trees, and given them a mixture of 1cwt. of bone dust and 1cwt. of mineral super. The size and quality of the fruit, as well as the growth of young wood for the next year, showed a marked improvement over the trees untreated. With most trees he did not think manuring necessary, but when there was evidence of a heavy crop being obtained, he considered an application of manure would strengthen the buds for the next year. The next

work was spraying, and the first application was usually to control fusicladium. That disease, combined with woolly aphis and codlin moth, were the chief enemies of the orchards in the Cherry Gardens district. Fusicladium could be controlled with the aid of a power pump and a spray of Bordeaux or Burgundy mixture. Bordeaux mixture could be made in the following manner:—6lbs. of bluestone, 4lbs. of quick lime, and 50galls. of water were required. The bluestone was suspended in a bag placed in 25galls. of water in a wooden vessel, with the bottom of the bag just touching the water. The lime was then slacked in an equal quantity of water, but in a separate vessel. Then the two solutions were blended bucket for bucket in the spray tank. In order to ascertain whether the spray had been made to the correct strength, it was a good plan to test the solution with a piece of red litmus paper. If the mixture were acid, the paper would retain its natural color, but if it were alkaline, it would give the paper a blue color, so if the mixture did not affect the color of the paper it would burn, and lime should be added to the spray until the correct strength was obtained. Burgundy mixture was made with the following ingredients:—6lbs. of bluestone, 10lbs. of washing soda, dissolved in 50galls. of water. The tests for strength were just the same as in the case of Bordeaux. The advantage in using Bordeaux mixture was that it was cheaper than the Burgundy, and did not bring any injurious chemical on to the land. The one disadvantage of Bordeaux was that it would not keep for a great length of time, but it would retain its good qualities for a week, which should be quite sufficient for most orchardists. An addition of 5oz. of casein to each vat of mixture would considerably improve the spreading quality of the spray. A further application of either of those preparations at the time of the first arsenate of lead spraying would, to a large extent, suppress any black spot that appeared after the first spraying. If black spot again made an appearance, lime sulphur could be mixed with lead arsenate at any time, in proportions of 1gall. of lime sulphur and 1½lbs. of lead arsenate to 50galls. of water. Codlin moth, he considered to be the worst pest of the orchardist, but control would be very much simplified if every grower assisted in suppressing the moths. A spray consisting of arseuate of lead with 5oz. of casein as a spreader, and ½oz. of caustic soda dissolved in every 50galls. of water was best. The first application should be made just when the petals were falling, but before the calyx of the flowers closed. A second spraying should be given about 10 days after the first, and the mixture applied should be of the same strength as the first, viz., about 2lbs. of arsenate of lead to 50galls. of water. A third, fourth, and fifth spraying at monthly intervals were, in the opinion of the speaker most necessary, finishing the main crop of Jonathan, Cleopatra, and Dunn's Seedling about the end of January. Careful attention to fruit hanging in large clusters and fruit hanging at the ends of limbs was most necessary. The addition of casein to the spray assisted in holding it between apples, and when the spray dried on the fruit poison would be found wherever two apples touched. Woolly aphis was best attacked in the winter time. A thorough spraying with 2galls. of red oil in 50galls. of water would check the pest when it appeared on the sawed off ends of limbs, &c. Later on in the season, when the leaves appeared on the trees, a preparation that would not burn was necessary, and nicotine sulphate used at the rate of ½ pint to 50galls. of water, if carefully applied, would wipe out the insects. If time permitted, the orchardist would be well repaid if he visited the orchard and thinned out the apples, removing those fruits that were spoiled with black spot or codlin moth. In connection with harvesting the crops, the grower should first be assured that he has sufficient room in which to handle the fruit, and an ample supply of cases on hand. One of the main difficulties in harvesting was met with when the fruit hung in large clusters on the trees, and perhaps only one or two fruits were ready for picking, yet the whole cluser would come away when the fruit was touched. That could be overcome to a large extent if the spurs were thinned out during pruning. He had come to the conclusion that better Jonathans were obtained if the spurs were thinned out rather heavily. If it was intended to place the fruit in cool storage, it should be left out in the night air, and delivered to the store as early as possible the following morning. A keen and informative discussion followed, and Mr. Basey replied to numerous questions.

HARTLEY (Average annual rainfall, 15in. to 16in.).
January 24.—Present: 11 members and visitors.

LUCERNE GROWING.—In the course of a paper dealing with this subject, Mr. H. S. Stanton said, in preparing a field for lucerne, no effort should be spared in the thorough cultivation of the land. The expense incurred in establishing a plot was heavy, but a good stand, which would last for a number of years, would amply reward the farmer for his labor. There was little difference, if any, in the method of preparing land for lucerne from that required for growing a crop of any of the cereals. There were, however, such operations as subsoiling, which were not warranted in the production of a cereal crop, yet for lucerne they would be amply justified. Experience showed that if rain fell after the seed had been sown it was quite safe to harrow within six days. The harrows would possibly destroy many of the young plants just ready to break through, but they left the soil in an ideal condition so that those seeds that survived made a thick stand. If harrowing were neglected, scarcely a seed would succeed in breaking through the surface of the land. That, of course, applied in those classes of soils that were inclined to set hard and were deficient in humus. The rate of seeding depended almost entirely on the conditions of the district, but as a rule 10lbs. to 12lbs. could be sown. The rate of seeding, he believed, was not such an important point as the preparation of the seed bed, the method adopted in sowing the seed, and the subsequent weather conditions. The general rule was to sow lightly under the most favorable circumstances. About the end of July was the best time for sowing in that district. Generally, harrowing and rolling should precede the final operation of sowing the seed. The seed should be covered with dust to a depth of ½in. Failure to grow successful crops of lucerne was in most cases due to deep sowing. The best plan to adopt in order to prevent deep sowing was to release the rod that connected the hoes to the stump jump springs of the drill so that each hoe would work independently. It had been found that the weight of the hoe when it swivelled was sufficient to cover the seed. Whether the implement passed over a bump or ran into a hollow the seed would be sown at the same depth, for the hoes were quite independent of the wheels. A keen discussion followed.

HARTLEY (Average annual rainfall, 15in. to 16in.).
February 13th.—Present: 18 members and visitors.

RABBIT DESTRUCTION.—On Wednesday members met and gave a demonstration on blowing up burrows with explosives, Mr. J. M. Hudd being in charge. A start was made on Mr. H. H. Cross's property, where some very large holes were dealt with. These holes will be watched with interest, as they have been the homes of rabbits for many years. Mr. D. F. Westwood's property was next dealt with, followed by Mr. J. M. Hudd's. Here the party sat down to lunch prepared by Mrs. Hudd and family. Rabbit warrens on Messrs. Davey, Wellar, and Howard's properties were also destroyed with explosives.

THE VALUE OF OATS.—The following paper, under the heading of "Benefit of Oats on a Small Farm" was contributed by Mr. C. S. Hassom:—"Experience has taught me that oats should be grown on every farm. If sown early in the season, even on dry land, oats will produce more feed than grass land, and then return a good harvest. They can be made to form part or the whole of the ration fed to almost all classes of farm animals, because in themselves they are a balanced ration for young or old stock. For horses, no substitute has been found that will give and maintain the same degree of mettle and staying power, either in the racehorse or the heavy farm worker; and for cows, oats are at least as valuable as bran for cream production. One piece of ground I sowed dry after grazing over three months cut over a ton of hay per acre."

LIFE MEMBERSHIP.—Mr. D. F. Westwood (Chairman) presented a life membership certificate of the Agricultural Bureau to Mr. S. Pratt, who has given 25 years of service to the Agricultural Bureau of South Australia.

LONGWOOD (Average annual rainfall, 37in. to 38in.).
January 19th.—Present: eight members and visitors.

HOMESTEAD MEETING.—The monthly meeting of the Branch was held at Mr R. Higgins's residence. An interesting feature of the property was the system installed by Mr. Higgins for irrigating by gravitation. Good crops of potatoes

and tomatoes came under the notice of members. In the fruit garden visitors favorably commented upon the healthy and clean appearance of the fruit. Mr. Higgins then directed the attention of members to a plot of loganberries, remarking that the bushes were very productive, and that the berries made excellent jam. Afternoon tea was provided by Mrs. and Miss Higgins.

MILANG.

November 10th.—Present: 20 members.

PIG RAISING.—Mr. W. J. Varcoe, who contributed a paper on this subject, said that pig raising had been a very profitable sideline for the dairyfarmer for the past few years on account of the high prices received for pigs. There was no farm animal that ate more in proportion to its weight or turned its food into a saleable carcass so rapidly as the pig. For sows and for growing pigs green feed should form the greater part of the ration, and when possible they should graze it for themselves. In addition to their sties, it was necessary to have a small paddock well fenced with pig netting and two barb wires, one along the ground and the other 4in. or 5in. above it, to keep the pigs from rooting the netting. In that paddock Cape barley should be sown when the early rains came, and that would make a good feed for the pigs to graze upon; it would also reduce the cost of raising the pigs in comparision with feeding grain alone. A supply of grain would also be required, and Cape barley would make a good feed besides being a good yielding crop to grow. Any grain could be used, but it should be well soaked or crushed before feeding to the pigs. The best breed to keep, he thought, was the Berkshire, but whatever breed of pig was kept it would not be a success unless it was well fed. The boar should be the first consideration. He should be pure bred and not used for stud purposes until eight or nine months old. The sow should be long, roomy, and deep, with broad loins and a strong back; she should possess about 12 evenly formed teats, and should not be mated until eight months of age. A sow should produce two litters a year, and breeding should be so arranged that the animal did not farrow during the winter time. March and September were the best months for farrowing, the weather being more temperate and suitable for the rearing of pigs. The sow should not be allowed to become too fat or a whole litter might be lost. About one week before the sows were expected to farrow they should be put in a pen and fed on soft food. After pigging they should be gradually fed up with grain and milk. At three or four weeks old the suckers would begin to feed themselves, and should be fed in a shallow trough by themselves. At four or five weeks of age the boar pigs should be castrated, and at seven or eight weeks could be weaned. They should be well fed for two or three weeks after weaning, and could then be put in the paddock and given grain and milk every morning and evening. When old enough to be fattened, they should be brought back to the sties and given as much grain and milk as they could clean up, four times a day. Pigs should not be marketed unless they were in prime condition, because it was the good quality that brought the best prices.

RAPID BAY.

January 5th.—Present: 23 members.

TRAINING A SHEEP DOG.—Mr. A. E. Bennett, in the course of a short paper dealing with this subject, said the training of a dog that it was intended to use for working sheep should be started when the animal was about two or three months old. To obtain the best results it was necessary that the dog should be trained under one master and at the age of five or six months. The young dog, if the early training had been correctly performed, should, at the word of command, sit down and remain in one position until further orders were given, even if its master was out of sight. The first training should consist of the young dog being taken out walking in a paddock in which there were no sheep. The dog should not receive its first lessons in working sheep until it was at least nine months old, and it should be fast enough to overtake a sheep on the run, otherwise it would be encouraged to run up closely to the sheep and bark. When starting out to work the sheep the dog should be held on a leash and taken into a paddock containing a flock of about 50 sheep. The sheep would then, as a rule, immediately circle, when the dog could be loosed and allowed to run around the flock two or three times. The dog should then be called to heel and carried home. That part of the education should be performed three or four days in succession, care being taken not to check the dog during that time. On the next visit to the flock a stick should be held in the hand of the master and the dog made to work on the opposite side of the sheep from where the master was stationed. After that had been repeated a few times, the dog could be brought behind the sheep to help its master in driving the sheep. In commanding the dog to work around the moving flock the master should always first bring the dog to heel before issuing a fresh order, the dog always being directed at right angles to the flock, in order to encourage it to work outwards from the sheep. A lengthy discussion followed. Samples of green maize and Federation wheat were tabled for the inspection of members.

RAPID BAY.

February 16th.—Present: 22 members.

CARE OF FARM MACHINERY.—Mr. G. Lord, in the course of a paper dealing with this subject, said the plough did not need a great deal of attention, the main points being to keep the bolts and nuts screwed up tightly and the axles well oiled, because the dirt soon collected around them and cut away the axles. If the cultivator were worked in stony or rough ground, care should be taken that the machine did not become hooked in roots or stones, and thus strain the tynes. The tynes of the harrows should be sharpened and screwed up so that the work would be done properly. They should not be left out in the paddocks, because the grass grew over them, and they became dangerous to horses. The drill should be thoroughly overhauled prior to each seeding. The stars should be taken out and well cleaned, and any broken cogs replaced. If rubber hoes were used, they should be taken off after each season, and put in the seed box to prevent their perishing. The binder should be given a thorough overhauling before hay cutting was commenced, in order to prevent delay after starting. The canvasses should be slackened after each day's work was completed. If they became wet they were apt to split. Strippers and harvesters should always be protected from the weather when not in use. During wet weather the bearings should be examined, so that they would be in working order for the succeeding season. The wheels, when left exposed to the weather, should be given a coat of paint or raw linseed oil about every two years. Wagon wheels, &c., should be cleaned and given a coat of paint at least every two years in order to protect the wheels and preserve the wood. When kept in sheds they did not need painting quite so often. Wheels with loose tyres should be taken to the wheelwright and retyred, thereby saving the cost of a new wheel. Sheds that were used for housing harvesters, strippers, binders, and other implements should be fowl-proof. If very often took a long time cleaning the machines after fowls had been roosting on them, and in most cases they were smothered with fowl lice. Grasscutter poles or shafts, when exposed to the weather, should be given a dressing of linseed oil to prevent their cracking. Fencing wire should not be used in the place of bolts.

ROCKWOOD.

January 21st.—Present: 15 members.

THE INTERNAL COMBUSTION ENGINE.—The following paper was read by M. H. C. Dunn:—"An internal combustion engine derives its power from expansion resulting from the burning of a mixture of a gas, or of some inflammable vapour and air, compressed at one end of the cylinder. There are several fuels in common use, the principal being gas, gasoline, kerosine, and alcohol. Most engines of small power are of a type known as 'four-cycle,' but there are also many 'two-cycle' engines. An engine is called 'four-cycle' because it requires four strokes of the piston for every impulse resulting from the explosion of the compressed gas. The first out-stroke of the piston fills the cylinder with a combustible mixture. Upon the first return stroke all valves are closed and the mixture is compressed. Just before this stroke is completed the compressed mixture is ignited, and as it expands it drives the piston on its outward or working stroke. During the second return stroke the exhaust valve is held open, and the burnt gases are forced out by the moving piston. The two-cycle engine requires only two strokes or one revolution of the flywheel for each impulse. The incoming charge necessarily mixes somewhat with the burnt gases not yet thoroughly driven out, and for this reason the two-cycle engine is neither as economical nor as reliable as the four-cycle engine. However, because of the light weight, and because power is applied more uniformly, the two-cycle is used extensively and to good advantage under many different conditions, particularly for marine work. Engine Troubles: How to Locate and Correct Them.—All ordinary troubles encountered whilst operating a gasoline engine may be divided into four classes—(*a*) Those that prevent the engine starting, (*b*) those that cause a 'dead' engine after running a short time, (*c*) those that cause a loss of power, and (*d*) miscellaneous such as cylinder troubles, worn valves, smoke, leaky gaskets, fuel supply, bearings and hot boxes, and cracked water jackets. Troubles which prevent an engine from starting are numerous. Difficult starting may be caused by faulty ignition, not enough fuel, too much fuel, water in the cylinder, and loss of compression. When it seems impossible to start the engine, look first for faulty ignition. The cause of non ignition (when the engine fails to ignite the first few charges) will not be removed by turning the wheels, but starting will become more difficult the longer they are turned, because the engine cylinder will become flooded with fuel. There is also a danger of filling the muffler and exhaust pipe with a risk charge, which, when ignited, is apt to rupture the muffler. Not Enough Fuel—The engine will get up to normal speed within a few seconds after starting if it is receiving fuel in proper proportion, and the ignition is in good working order. When working under a load it should take a charge every three or four revolutions and fire each charge. A dead explosion and black smoke issuing from the exhaust pipe indicate that the engine is receiving too much fuel, because the charges that are taken in are not all ignited or thoroughly burnt. It is possible to choke down an engine by feeding too much fuel, just as easily as by not feeding enough. Do not feed more fuel when more power is wanted. Flooding the cylinder is frequently the cause of the engine failing to start. Loss of Power—Leaky valves, worn piston rings, misfiring, choked inlet and exhaust passage, and back firing. If the valves are leaky, they permit loss of compression. They should be taken out at once and cleaned and reground, if necessary, so that they seat perfectly. See that they work freely and easily in the valve guides. If the stems are gummed, use a little kerosine or petrol to loosen them. Leaks in valves may be detected by turning the engine against the compression and listening for escaping charges. If there is a barking noise in the cylinder it indicates the escape of the explosive force past the piston rings. If the rings are worn to this extent they should be carefully filed or replaced by new ones well fitted into their grooves, so that they bear at all points of their circumference on the cylinder wall." An interesting discussion followed.

SHOAL BAY.

December 18th.—Present: 16 members.

MOUSEPROOFING HAYSTACKS.—Mr. G. Patterson, who read a short paper dealing with this subject, suggested the following plan for preventing mice from entering a stack:—"Obtain 20 to 30 poles, each about 5ft. long by 8in. thick. Char the posts in a fire to prevent damage from white ants, and put each post about

3ft. in the ground at equal distances over the area on which it is intended to build the stack. Next a number of kerosine tins should be obtained and the tops cut out, one piece of tin being fastened over the top of each post. The platform to carry the hay could then be built on the top of the posts. Care should be taken not to leave a ladder or any piece of timber leaning against the sheaves, otherwise the mice would be able to gain an entrance into the stack."

CHERRY GARDENS, February 19th.—Mr. F. Coleman (member of the Advisory Board of Agriculture) attended the meeting, and delivered an address, "Mixed Farming and Dairying."

MEADOWS, November 21st.—Mr. R. G. Morphett, of the Kangarilla Branch, attended the meeting, and read a paper, "Fruit Culture." (*See* page 614. January, 1924, *Journal*.—ED.)

McLAREN FLAT, January 17th.—Mr. G. Butler, of the Kangarilla Branch, attended the meeting, and delivered an address, "Poultry." Mr. Blair, a visitor from Adelaide, was also present, and spoke on the subject, "Chemistry of Sprays."

MOUNT PLEASANT, January 11th.—A general discussion on the feeding of dairy cattle, which arose from a paper read at a previous meeting by Mr. E. J. Tapscott occupied the attention of members. Several other subjects of local interest were also brought before the meeting for consideration.

MOUNT PLEASANT, February 8th.—A short discussion took place on the subject, "Machine *v.* Blade Shearing," all members expressing a preference for shearing with the machines. Information has been received from the Hon. Secretary (Mr. P. Haeusler) that the Branch has formed a course in wool classing, under the instruction of the Wool Instructor at the School of Mines (Mr. A. H. Codrington).

TWEEDVALE, February 21st.—Seventeen members and 10 visitors attended the February meeting, which took the form of a "Question Box." Twelve questions of local interest were submitted, which resulted in an instructive discussion.

SOUTH-EAST DISTRICT.

GLENCOE (Average annual rainfall, 33.84in.).

HAYMAKING AND STACK BUILDING.—Mr. Ferguson, in a paper on this subject, said an early sown crop of Algerian oats generally formed the hay crop in that district. He was of the opinion that a paddock of oats, seeded at the rate of 2bush. to the acre and drilled in with 100lbs. of superphosphate about the end of July, would produce a hay of far better quality than an earlier sown crop. Early sown oats, unless fed off to some extent, were inclined to grow coarse and rank, while the late sown oats grew a finer straw and made a much more palatable hay. Land intended for hay should receive particular attention in regard to cultivation at seeding time so that the oats could be cut close to the ground. Whilst he thought that Algerian oats made splendid hay and chaff, he had a decided preference for a mixture of wheat and oaten hay for chaff. He would not advocate sowing mixed grain, but advised putting load for load in the stack unless the farmer was cutting a large quantity, in which case the oats and wheat should be stacked separately. During the past seeding he mixed 8lbs. of black vetches with 1bush. of oats per acre in his hay paddock, and whilst the exceptionally wet season prevented the vetches from making headway on the heavier soils, at the present time on the sandy soil they were as high as the oats, and had the appearance of dominating the oats because they were still growing vigorously. For dairy cows he believed that hay of vetches and oats would be the best. Much had been said and written with regard to the bitterness of Algerian oaten hay when cut green, but at the same time he thought that farmers very often went to the other extreme. He would cut his oats for hay when the heads had just taken on a slight creamy tinge; at that time the stalk was still fairly green, and if stooking was kept up about half a day behind the binder one gathered succulent straw and got a

fair amount of grain in the head. When commencing to cut the crop, he preferred going the reverse way first, *i.e.*, cutting from the fence and dropping the sheaves in the crop. On the completion of the first round one could turn around and take a width the other way when the sheaves dropped on the first round would be just outside of the grain wheel and could be quickly thrown clear; by the time another round had been cut stooking could commence. He thought that method would entail less work and waste than the other system of cutting around the fences when the rest of the paddock had been finished. He would make the sheaves fairly large so that a man could pitch them comfortably. Small sheaves used more twine per acre, and were also a waste of time from the stook to the chaffcutter. Twenty to 30 sheaves would make a fair sized stook; he preferred to make the stooks even so that they would cure evenly and yet would stand firm in bad weather. He found that sheaves of average length, tied about 1ft. to 15in. from the butt, were better to handle than those tied nearer the heads. It was always worth while to take a little trouble in regulating the tying of the sheaves. When they became loose through the band slipping towards the head they were a continual source of annoyance. The length of time that hay should be left in the stooks before stacking varied with the condition of the crop when cut, and the weather. He thought that one could safely commence carting when the hay had remained in the paddock for a fortnight. He had commenced carting 10 days after cutting. If possible, he would build hay stacks east and west and open them for cutting at the east end. He had found that whilst dunnage would keep the bottom sheaves from getting damp it gave the mice an excellent opportunity to nest there and work upwards into the stack, therefore, a good thick layer of straw was to be preferred for a stack foundation. For stacks of 40 tons or 50 tons he thought that 4½yds. to 5yds. was sufficient width, and the length could be regulated as necessary. A narrow stack required less roofing and was more easily covered in case of rain. The higher the walls were made the more solid would the stack become, and there would be less opportunity for the mice to damage it. He built the inside courses of the stack with the butts out, but if the centre of the stack were always kept full he did not think it was of any consequence whether the heads or butts were placed on the outside. The main factor was to place the sheaves so that there was a slight dip outwards. Each course should be bound firmly with the succeeding one; that would ensure the stack having a slight spring, and a well sprung stack would not take in the rain. The outside course of sheaves should be built on edge and packed as closely as possible; all the other courses should be placed flat. He always put a double course of inside sheaves before commencing to roof, and then built the outside sheaves on the flat instead of on edge. In that district all haystacks should be thatched as soon as possible so that there was no need for a steep roof, but at the same time every care should be taken so that the outside sheaves would shed rain in case it should fall before the stack was thatched. In conclusion, he said members should be warned by the experience of the past autumn and winter to deal fairly with the stock by cutting a sufficiency of hay to ensure more than a starvation ration for the coming year.

KALANGADOO WOMEN'S (Average annual rainfall, 33in. to 34in.).

December 8th.—Present: nine members and visitors.

JAMS, JELLIES, AND PRESERVES.—The following paper was read by the President (Miss E. Hemmings):—"To make good jam do not have the fruit over-ripe, because this tends to make the jam 'squashy.' For most jams ¾lb. of sugar to 1lb. of fruit will be sufficient, but for very sour fruits, such as gooseberries, plums, etc., a little more sugar is needed. There are various methods of making jam. Some people prefer to cut up the fruit, place sugar on the top, and allow it to stand over night, then pour off the syrup and bring to a boil and drop in the fruit. Others prefer to cut the fruit when ready to commence, and put sugar and fruit on the fire together. I have tried both ways and found them both successful. One of the main points to bear in mind is once the jam begins to boil, keep it boiling briskly, and as the scum accumulates on the top, skim it off. When the jam begins to settle, special care must be given to keep it well stirred from the bottom to prevent it burning. No set time can be stated as to how long the jam should be boiled, because this depends largely upon the kind and the conditions of the fruit and the quantity being made, also how quick a fire is used. Apples and quinces require enough water to come level with the top of the cut-up fruit

Melon Jelly.—Obtain 12lbs. fairly green melon, wipe and cut it up, but do not peel or remove the seeds. Three pineapples are necessary, and these should be washed and cut, but not peeled. Six lemons will also be needed, and some of the peel may be removed from the lemons if desired. This is gauged mainly by one's taste. Add about half as much water as is used for apples, because the melon is more juicy. Boil and strain as previously suggested, and return the pan to the fire, adding one cup of sugar to one cup of juice. When boiling, add a little tartaric acid and boil gently until finished. In making jelly, it will be found that most of the jelly qualities of the fruit are in the peels and seeds; this is why it is most important not to peel or seed. If one wishes to study economy, apple or quince jelly may be made from peels and cores alone. *Preserves.*—The fruit should be ripe but firm. Stoned fruit can be cut in ½in. squares and packed in jars, whilst the small fruits, such as prunes, cherries, &c., should be wiped, the stems removed, and dropped into the preserve. Peaches should be peeled, and may be sliced if desired. Pears, unless very large, may be peeled, cut in half, the core

removed and packed. Make a syrup of 2lbs. of sugar to 1gall. of water. Allow this to stand until cold, then pour it over the fruit until the jar is full. Pack the jars in a boiler with straw to prevent them breaking and add sufficient cold water to come nearly to the necks of the bottles. Bring the water gradually to the boil, and boil gently until the fruit is cooked. Do not allow it to cook too much, otherwise it will not keep so well. Apricots need less cooking than most other fruits. Immediately the jar is removed from the boiler, put on a rubber ring and screw on the lid as tightly as possible. Turn the jar upside down, and if it leaks it is not air tight. Remove the lid and add another rubber ring. If this does not act, try another lid. It must be screwed so that it will not leak, or the fruit will not keep."

REARING CALVES.—At a previous meeting Mrs. C. Campbell read a paper dealing with this subject. Calves, she said, should be reared from the best cows, but it was not advisable to rear a heifer's first calf. A calf could be more conveniently taught to drink if the animal were tied up, because the feeder had more control over it. It was a good plan to give the calf new milk for at least the first six weeks, especially if feeding with whey. The reader of the paper had found that calves did better on separated milk than they did on whey. If feeding with whey, it was advisable to add a little concentrated meal and new milk. To prevent scours, she said it was advisable to burn the milk with hot irons and add a little salt or lime. Rubber teats were used very considerably for rearing calves, and they seemed more natural than the fingers. Troughs and feeding utensils should be kept clean. It was a good plan to keep the calves shut off in a small paddock by themselves. The most profitable cows for dairying were the Jersey, Holstein, and Milking Shorthorn. Mrs. Campbell expressed a preference for the Milking Shorthorn. The Jersey was of rather a delicate constitution for the South-East. Cows should be provided with rugs during the winter months. A comfortable rug could be made from three wheat bags. Milking, if possible, should be performed at regular hours and done as quickly as possible. Each cow's teats and the milker's hands should be washed before milking. If a cow was hard to milk, the speaker suggested rubbing the teats between the palms of the hands. Heifers coming in on their first calf were very subject to swollen udders. A good remedy for that was to bathe the udder in warm soapy water before milking. If dairying was undertaken seriously, one should have the cows tested at least once a week. It paid better to feed one cow with a good test rather than two showing lower yields. The feeding of the cows was a very necessary practice, especially during the winter months. The cows should be fed twice a day on oaten chaff, bran, and a ration of green fodder. She had found it a good plan when feeding chaff to scald the fodder and allow it to stand all day. Molasses could be added with advantage. Sudan grass, lucerne, or maize and bonemeal, and an abundance of fresh water, would prove beneficial to the animals during the summer months.

KONGORONG.

January 22nd.—Present: 11 members and visitors.

Mr. F. C. Caine read an article, "Poa Aquatica," and an interesting discussion followed.

DAIRYING AND ALLIED INDUSTRIES.—In the course of a paper, under the title "Advice to the Beginner in Dairying," which was read at the November meeting, Mr. C. Dixon said in using the term dairying he meant that to include the raising of pigs and poultry. He believed that in the course of a few years the districts that were within a comparatively short distance of the city would be called upon to supply the metropolitan areas with a greater quantity of dairy produce than they were doing at present. A feature of dairying was that much that was taken out of the land was returned to the soil in the form of manure. If the cows were properly handled, quick and constant returns were assured. Now that overseas freights had been considerably reduced, the time was ripe for South Australia to establish an export trade in pig products. Probably one of the mistakes that the beginner in dairying would be likely to make in the stocking of his holding would be that of attending the open stock markets and making purchases irrespective of the breed or type of cattle that he selected. The better plan was first of all to decide on the breed that was most likely to suit local conditions,

and then rigidly adhere to it. A few animals should be obtained from the herds of reputable breeders, and if it were not possible to obtain sufficient animals for immediate requirements the beginner should be content to commence with the best animals with the means at his disposal, and await an opportunity to obtain pure-bred animals. Care should at all times be exercised not to overstock the holding. Only the services of a pure-bred sire should be used with the herd, and the matings should be so regulated that the cows would return an uninterrupted flow of milk right through the year. One of the most important factors in the success of the dairying industry was to provide for an adequate supply of fodder. For early green feed the speaker recommended Cape barley, and for winter feed oaten chaff with crushed grain. For summer fodders, kale, chou moellier, millet, and mangolds would give good returns. Half of the ration fed to dairy stock was utilised in the maintenance of the animals, and it was to the other portion of the feed that the dairyman looked for production and profit. The ration should contain a liberal amount of concentrates in the form of bran, crushed oats, or barley, and feeding would be carried out to the best advantage if the ration for the cows were weighed or measured. Keeping the stock in comfortable paddocks by supplying them with shade and shelter would, the speaker said, do much towards aiding production and reducing the cost of the feed bill.

NARACOORTE (Average annual rainfall, 22.60in.).

December 8th.—Present: 10 members.

SOUTH-EASTERN TIMBERS.—In the course of a paper dealing with this subject, Mr. J. Corner said there was a large demand for all classes of locally grown timber at the present time, and good prices could be obtained for it. The local red gum

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was always in demand for sleepers for railways and blocks for street paving. It was an excellent timber for the construction of bridges. Another fine timber was the South-Eastern blue or white gum. It was superior to the red gum for building purposes, and made very good weatherboards and floorings, being close grained and free from splinters. When properly seasoned, stringy bark could be used for many purposes, such as furniture manufacture, buildings, and fencing posts. The Hill gum was a very useful timber, and there was an excellent outlet for it at good prices. Mr. J. Donoghue referred to the usefulness of stringy bark, but it was, unfortunately, disappearing very rapidly. Mr. W. E. Rogers said red gum could be planted to advantage in the Naracoorte district, and it made excellent fencing timber. Mr. A. B. Feuerheerdt said the question of afforestation was one which should be of interest to every one in Australia. Australia had the finest hardwood timbers in the world, but it was very regrettable that so little was done to keep up the supply, the great fault being that no systematic steps were taken to preserve the forests. Another good timber that was quickly vanishing was the sheaoak.

PENOLA (Average annual rainfall, 26.78in.).

February 2nd.—Present: 11 members and visitors.

TOP DRESSING PASTURES.—In the course of a short paper dealing with this subject, Mr. S. Ockley expressed belief in the value of top dressing pastures and growing fodder crops, such as Sudan grass, Japanese millet, and chou moellier to carry stock over the autumn months. Members were disappointed with the results obtained from Sudan grass, it being generally agreed that the poor crops were the result of bad germination. Mr. Adamson thought that immature seed would possibly account for the poor germination.

RENDELSHAM.

December 19th.—Present: 15 members.

RABBIT DESTRUCTION.—The rabbit was one of the greatest pests that farmers had to deal with. It was not only very destructive, but ate the choicest grasses, said Mr. W. R. Galwey, in a paper dealing with the above subject. The problem that confronted the landholder was how effectively to deal with the rabbits. Poisoning, he considered, to be a waste of time, but thought cultivation and trapping the surest method of control. In the discussion that followed, Mr. W. Andrews stated that the first work in clearing the rabbits off a property was to subdivide and net the paddocks, and wherever possible to plough in the warrens with a disc plough. Then when the paddock was cleared a few traps and dogs would destroy the stray rabbits. Mr. H. Stewart expressed a preference for fumigating the burrows. Mr. W. Foster held the opinion that if a Government inspector were appointed, and the Vermin Act strictly enforced, the rabbits could be easily destroyed.

TANTANOOLA.

January 11th.

IRRIGATION.—In the course of a paper dealing with the utilisation of the water that was at the present time running to waste in the district, Mr. R. Campbell contended that much land that was idle and dry during the summer and early autumn months could be put under intense culture with the aid of water pumped from the adjacent drains or, where the drains did not exist, from the spring waters that were within easy reach just below the surface. The district was noted for its suitability for dairying, and there was apparently no reason why, with the use of water and fertilisers, the carrying capacity of the land could not be increased manifold. In favorable seasons that locality had produced maize 13ft. in height, and mangolds had been grown estimated to yield 100 tons to the acre; but those object lessons of the past appeared to have been obliterated by

succession of successful barley years. An experienced irrigationist and successful dairyman who recently visited that district thought that much of the reclaimed land would yield 80 tons of maize to the acre under irrigation. Some years ago Mr. C. Kiely carried out some experiments which were most successful, but the high cost of petrol and the want of a market for tomatoes deterred him from continuing operations. In Victoria many country districts supported sauce and jam factories, and much of their produce found its way to the South-East, and there was no reason why that district, which was so well supplied with water and suitable land, should not be able to compete with the other favored districts in Australia. There were thousands of acres of adjacent lands that would grow excellent export apples with or without irrigation, and about 100 miles of railway connected them with Portland, a favorable overseas shipping port.

TANTANOOLA.

February 2nd.—Present: 13 members.

CLOVERS.—The following paper was read by Mr. J. Carthew:—"The trifolium family consists of quite a number of species, and whilst differing in many respects, they, as the name indicates, are all three-leaved, and constitute a subject for study full of interest and possibilities. Most of the family find congenial conditions in the temperate climates of Europe and in the moister districts of Australia, and this district should be no exception to the general rule. As a first-class dairy pasture clovers take a very high position, and more attention should be given them in the South-East. Care should be exercised in making the best selection suited to the locality, and evidence is now being collected from local experiences and natural conditions which should be helpful to landholders. The clovers of most popular repute in the clover-growing districts of Australia are as follows:—White Dutch, Alsike, Suckling, Crimson, and Red clover. There are two varieties of Burr clovers, and four varieties of Melilotus, both of which belong to the family Leguminosae. Birdsfoot and the black-seeded trefoil are both adapted to this district, and recent experience demonstrates that Strawberry and Subterranean clover are likely to play a most important part in reclothing our arable lands, the former on the wetter and the latter on the drier sandy rises. One of the best known is the White Dutch, which does well in this district. It resembles the Strawberry, inasmuch at it extends by underground stems, but where stock have access to it continuously it does not have an opportunity to extend itself. It is perennial when once established. Strawberry clover does best on the low-lying damp land, and finds a congenial home in the reclaimed water courses, cleared ti-tree land, and in the heavier peaty soils, all of which abound in this district. It is abundant on the roads, where it finds congenial conditions, and landholders are giving it more attention than ever before, and where established it is given an opportunity to mature its seed. As it comes late, it blooms late, and it is green when most other feeds are dry. This fact points out its value as pasture in a dairying district. It is a rich milk producer, and where stock have continual access to it they keep it so short that this alone supplies strong evidence as to its palatability. For this reason it should be given a spell when flowering time approaches until the seed is matured. Given this consideration there will be no question as to its area being extended at comparatively little cash outlay. As a result it becomes permanent when once established. Seedsmen recommend this variety for heavy land liable to crack in the summer time. Many of the clover family are not only good pasture plants, but also make good hay. Subterranean clover is suitable for the higher and drier sandy and stony rises, of which there are considerable areas in this district, and reports say that much of this class of land will be sown to it this season. To give it its best chance, it should be sown with the first rains and not later than April, i.e., unless sown with a cover crop, and then the earlier the better. When green, it forms a first-class pasture for sheep and cattle, and has the great advantage that it is a winter grower. Subterranean clover has the reputation of causing bloat in cattle, but this can be avoided by not turning the stock on to it when hungry, or when the feed is wet, or by not leaving them on it for lengthy feeding periods. My own experience with Burr clover this season is favorable. The plot consisted of about 10 acres of self-sown crop on land where oats had preceded. The stock were shut off from it during the depth of winter, and it then gave an abundance of feed.

It is a splendid green pasture in the spring, and, when dry puts both cattle and horses in prime condition. Evidences from other districts support my experience. The best knowledge of these plants is to be obtained by going about the district and noting where they grow, and which varieties do the best in the particular soil in which they grow. All clovers are soil improvers, and the fact that they are mostly appreciated by stock makes the extension of their cultivation highly desirable. Generally they grow better on land that has been cultivated."

"STRAWBERRY CLOVER."—The following paper was read by Mr. R. Campbell:—"There appears to be a good deal of confusion in the minds of many in confounding Strawberry clover (*Trifolium fragiferum*) with Subterranean clover (*Trifolium subterraneum*). The latter is generally recommended for sandy and dry soils subject to a good rainfall, but it will not stand inundation. It buries its seed pods in the soil and bears a small white flower with a crimson blotch at the base of each flower, whereas the Strawberry clover is perennial, and when once seeded under congenial conditions will last a lifetime. It has a shaded crimson flower head of oval shape, and its seed head is of the same shape on an upright stalk. It will grow in very wet ground, and will even stand many months of inundation without serious detriment. It will grow on high and dry land, but does not show anything like the same growth as when sown on wet land, especially if the latter be a reclaimed ti-tree bottom. It does well on heavy black land subject to cracking in the summer time. Like all other trefoils it responds liberally to a generous dressing of bone or other super. There are many places in the district where the plant is to be found, but principally on roads, where it has probably been introduced by travelling sheep. It has been confused with the small pink flowering clover so abundant on the roads this season, but there is actually no similarity in the two plants, except that they are both clovers. This particular variety has a distinct woolly seed head, and thus derives its name (*Trifolium tomentosum*) therefrom. It, too, like the Subterranean, is an annual, and there are evidently two varieties of it, because there is a slight difference in the seed head, one having yellow, and the other brown or black seeds. Strawberry clover was introduced to the district by the late Mr. Thomas Williams, of Moorak. The plant is readily propagated by heeling-in single pieces of the runner bearing a joint, more substantially from pieces of sod in which the plant is growing, and from seed, but unless the conditions are specially favorable, the plant does not make much headway during the first season from sowing. Solitary plants when established will so extend themselves that in a few years if not fed too closely they will cover an area several feet in diameter. For those who have large areas which they are desirous of sowing to this plant, and do not care to spend as much in seed as it would require, a good plan is to sow a fair sized paddock, let it come to maturity and ripen its seed, turn sheep on it for a day of two, then turn them over the larger area. There are many thousands of acres in the South-East, from Kongorong to Lake Hawdon, Lucindale, Penola, and Naracoorte, where the plant will thrive under the abundant rainfall, of which the district sometimes has too much, but not for Strawberry clover."

ALLANDALE EAST, February 22nd.—Mr. A. Kieselbach, a member of the Mount Gambier Branch, attended the meeting, and delivered an address dealing with various subjects of local interest.

FRANCES, January 26th.—The subject, "Rinderpest in Cattle," was brought before the meeting, and a lengthy and interesting discussion resulted.

KONGORONG, February 18th.—Fourteen members attended the monthly meeting of the Branch, when the matter of fencing the local experimental plot was brought before the meeting for discussion.

WIRREGA, February 12th. The manager of the Kybybolite Experimental Farm (Mr. L. J. Cook) attended the meeting, and delivered an address, "Subterranean Clover."